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Communications relating to membership and matters pertaining to the American Veterinary Medical Association itself should be addressed to Secretary C. M. Haring, University of California, Berkeley, California. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

A. V. M. A. MEMBERS AND THE JOURNAL

Some of the earlier numbers of the *Journal* have been sent to all of the members of the A. V. M. A. whose names appeared upon the list, although the dues had not been paid in every case. The Post Office Department requires a "legitimate list" of subscribers among the association members, which is interpreted to refer to paid-up subscribers. The subscriptions of members are paid from their dues and in order to fulfill the requirement it will be necessary that the dues should be paid up to date. Therefore, those members still indebted to the association should see to it that their accounts are balanced if they wish to continue to receive the *Journal* as members. The secretary will notify us promptly when the payments are made.

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VETERINARY EMBLEM

The chairman of the committee on Emblem of the A. V. M. A. is desirous of obtaining all information and data possible on veterinary emblems used by veterinarians, veterinary societies and veterinary branches of the armies of this and foreign countries.

With the idea of obtaining and compiling as much information as is necessary to bring the matter intelligently before the committee, he is anxious to give an opportunity to all the members of the A. V. M. A. and veterinarians in general, so as to submit such designs as may be suggested for an emblem.

In order that data may be compiled for a report and a definite end reached more quickly, suggestions and communications should be sent to the chairman, O. A. Longley, 616 Eye St., Fresno, Calif.

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VETERINARIANS AND ARMY SERVICE

At the February meeting of the Missouri Valley Veterinary Medical Association, Dr. Vans Agnew called attention to the difficulty experienced by the Quartermaster's Department in getting efficient veterinarians for emergency service. Under present conditions the department advertises for veterinarians and frequently has to employ men not very well qualified. It seems self-evident that any plan which will increase the efficiency of the Army Veterinary Service should receive due consideration and that the earlier it is considered, the better. As a National organization the A. V. M. A. may be expected to take some action in the matter. It's next meeting is still some months away, but it is none too early to give the problem consideration and formulate plans for promoting the desired efficiency.

The Missouri Valley organization, with commendable promptitude, appointed a special committee to consider the matter and the following report was adopted:

"In view of the difficulties experienced by, and to facilitate the work of the Quartermaster's Department of the United States Army, the Missouri Valley Veterinary Medical Association recommends that the American Veterinary Medical Association prepare, for the use of the Quartermaster General, a list of qualified veterinarians available for army service in case of emergency; such a list to indicate the branch of service for which the veterinarian is best adapted.'

Committee:

N. S. MAYO
B. W. MURPHY
J. H. OSTERHAUS

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SHOULD OUR SYSTEM OF THERAPEUTICS BE REVISED?

At the risk of being branded as iconoclasts, wise, thinking, practitioners now seldom hesitate to challenge the views about drugs that were forced upon them in the class-room and over which they were compelled to "burn the midnight oil". In fact, wherever the subject of therapeutics is discussed now-a-days among old, experienced, progressive, practitioners the cherished belief they once entertained about the curative properties of drugs is *without exception* is actually ridiculed, and it is extremely doubtful if there could be found in the whole profession a single man who would or could attribute his success to a profound knowledge of orthodox therapeutics. On the contrary, almost everyone unhesitatingly insists that the conventional instruction he received was so erroneous that years elapsed before the truth dawned upon his deluded mind.

It seems that the teaching of therapeutics loses attraction when not metaphorically adorned and that those engaged in that enterprise have been slow to shape their instruction to conform with modern discoveries in medical sciences.

What is wrong with this branch of our science that those who practice it most should respect it least; that few thinking men will follow its consecrated doctrines through life; or even court a closer acquaintance with its dogmas after a few years of experience; that success in practice comes only after its fallacies have been dispelled; and that almost everyone so soon loses faith in its principles? The whole system of therapeutics, that is, the time-honored system ex-

tolled from the lecture platforms and in our voluminous text-books seems to need revision; or better still it should be eliminated in order that it might be rebuilt of a different fabric and upon an entirely different foundation.

True, the system is slowly undergoing revision but the transformation is too slow and it is unfortunate that the changes come more from the practitioner than from the teacher of therapeutics. Students are still taught that drugs are very effectual weapons against disease. They are taught without equivocation that these weapons may be depended upon to *fight* disease, and from these precepts the impression is invariably gained that such a thing as a mortal termination of a disease must henceforth be a curiosity. It does not matter how much the pathologist, the physiologist and the surgeon preach the gospel of simple therapeutics, or how much modern discoveries expose the fallacies of the system, this branch goes merrily on with dreams that start the student out with an entirely false conception of the healing art.

This is not as it should be at this day and age. Are there not enough truths in this branch of our curriculum to occupy the time of students without burdening them with a misguiding travail that neither disciplines the mind nor respects facts? It seems plain that the unsuspecting student has been misled too long for the good of the cause, that the time is here to speak the plain truth about the actual merit of drugs, that the days of the shot-gun prescription are over and that the medical armament of the day does not contain the best weapons of the physician. In short, the student as he leaves college should already be the skeptic, the agonistic he is sure to become as soon as he begins to think for himself.

The harm arising from this childish faith in our academic therapeutics is by no means imaginary; it is real. The recruit is armed with ordnance the expert has learned is too freakish to comprehend, too unreliable to insure, too intricate to control, and his mind is diverted from such harmless and effective weapons as effectual quarantine, perfect disinfection, scientific ventilation, rational surgery, balanced regimen, bodily comfort, seasonable clothing, comfortable bedding and cheerful surroundings, all of which the present system of therapeutics teaches by inference, are secondary to its medical propaganda.

In spite of years of experimentation, investigation and research uncertain theories predominate over facts, exaggerations overshadow

truths and the best arguments are still drawn from the realm of empiricism. Does not our cherished system of therapeutics need revision? L. A. M.

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"HIGH STANDARDS"

We recently received a bulletin, issued at a veterinary college, containing an article on the above subject with certain paragraphs marked for our benefit. One paragraph states that the country boy is needed in the veterinary profession and that it is well when comparing equivalents to consider "whether the training which a youth receives in his daily farm life is not equal to that of a high school diploma".

It all depends on whether a veterinary *trade* or a veterinary *profession* is desired. Contact with animals and their surroundings is not a substitute for knowledge. If a boy should be born in a stable he is not necessarily "called" to be a veterinarian, because of the environment of his birth, any more than a boy accidentally born in a church is "called" to be a clergyman. Many of the old-fashioned "horse doctors" were country-born and bred and we have no doubt that a great number of them had an intense love for animals. Is it wise to go back to that standard? There is nothing incompatible between a country boy and a high school diploma or even a university education. Many have acquired both and we believe the number is growing. Is it not stigmatizing the country boy unnecessarily to insinuate that he is incapable of a high school diploma? The country "horse doctor" did not consort to any great extent with other professional men, nor did he always stand high in the respect of the community. Other professions have not accepted vocational experience as a substitute for education. Why should the veterinary if it aims to be on a par with other professions? Of course we need the country boy; we also need the city boy. We need any boy *with brains.*

The final paragraph asks: "Is it better to study Caesar, or milk cows when the veterinary embryo is in the making?" Milking cows does not materially assist a professional man in writing prescriptions, which should involve some knowledge of Latin. Again it seems to us, especially "when the veterinary embryo is in the making", it is better to cultivate brains and that Caesar is quite as good as milking for the purpose. P. A. F.

DR. C. J. MARSHALL TO GO ON A FOREIGN MISSION

The reports which have been published of the excellent work of the military veterinarians on the western battle front in Europe have induced a friend of the University of Pennsylvania to donate a fund to be used to send a veterinarian to England and France to make observations in the hope that information will be obtained which will be of service in this country. The veterinary corps of the English Army has been especially efficient in caring for horses wounded in battle or exhausted by hardships and it is believed that much can be learned from the experiences of the members of this corps, which will be of value to veterinarians and others. Dr. C. J. Marshall, Professor of Veterinary Medicine in the Veterinary School, has been selected for this important mission and it is expected that he will sail from New York on the steamer Rotterdam on March 7th. He will go first to England where he will study the organization of the veterinary corps of the English Army and the methods in operation in the concentration camps to prepare the horses for service and to protect them from infectious diseases. From England he will go to France where he hopes to have an opportunity to observe the methods of treating wounded and exhausted horses at the front and in the base hospitals. He will also study the measures taken to prevent the introduction of infectious disease and observe the methods used in caring for the horses in the military camps and remount stations.

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EUROPEAN CHRONICLES

Bois Jerome.

Sugar in Surgery. In a series of articles published in *La Clinica Veterinaria*, Doctor Girardo Bussano, assistant and lecturer docent in the veterinary high school of Milano, has called attention to the application of sugar in veterinary surgery and sustained his suggestions by the record of quite a number of successful cases where sugar was the essential element of treatment.

Proceeding with an historical part, the author tells of Galen, who recognized the antiputrid property of sugar and had used it for the preservation of cadavers. Continuing by the various applications, which gradually brought it in use in human surgery,

where he found it employed against ulcerations of a serious nature, in hospital gangrene, in wounds with large loss of substance and again in catarrhal ulcers of the mouth and fauces, in chronic catarrhal pharyngitis, laryngitis and tracheitis, or in catarrh of the nose and frontal sinuses, Bussano tells of its properties in cases of intoxication with metallic salts, such as copper, lead, silver, gold or mercury. Its beneficial effects are then demonstrated by the records of experiments, where its antiseptic properties are shown by Fisher, Billroth and others. Kühne, after experimenting with solutions of sugar, for the washing of the abdominal cavity, advocated irrigations of that cavity in the treatment of acute peritonitis and concluded that sugar prevents intestinal putrefaction.

Later on Magnus and others experimented to establish the manner in which the organism would behave in regard to the introduction of solutions of sugar. Such were injected under the skin and into the veins. Experiments were made on animals and one man. The conclusions from the experiments were that sugar offered a means of treatment without presenting danger. Its disinfecting properties, its ready absorption, its deodorizing power and the sound and rapid development that its application promotes in granulating surfaces, all point to its usefulness.

These facts thus reviewed from the literature extending from 1883 to the present time, found their application at the clinics of the Milano school, where numerous trials were made and wonderful results obtained.

The indications where sugar was used varied much. It was used with sutured solutions of continuity, instead of being dressed with antiseptic powder, iodoform, xeroform, or others. Or again in open wounds with loss of substance which were to cicatrize by granulation and which were treated likewise. However, it was in injuries of the foot that sugar was used in the greater number of cases.

The *modus operandi* is very simple and is as follows: with sutured wounds simply the application of the sugar finely powdered, so as to form a kind of crust under which the cicatrization will proceed *without suppuration*.

With open wounds where loss of substance exists or after foot operations, when a part or whole of the wall has been removed, the parts are first thoroughly and minutely washed with sterile water and then a coat of sugar is applied so as to form a rather thick coat upon which should be applied the absorbing and com-

pressing gauze or bandage, supported by the necessary apparatus.

The first dressing can be left 48 hours but the following ones can be left 7, 8 or 9 days and sometimes 10 or 11.

When the dressing is changed the wound looks well, granulating with healthy color, unless the pressure of the dressing has been too great, when the granulations may not have as sound and rosy an aspect but look as if they had been asphyxiated.

What is readily to be observed, in foot injuries, is the rapid formation of the new horn. which in a few days has assumed conditions such that the wearing of a shoe is possible.

As the author remarks, he has had many opportunities to resort to sugar medication and the results he has obtained justified his endorsement of its use.

Out of a large list of cases he has selected and described twenty of various kinds and severity: such as a large gangrenous wound of the middle of the anterior face of the left metartarsal, which is handsomely illustrated, cases of canker of the foot, fibro-sarcomatous growth, complicated punctured wound of the foot with removal of the sole and wall, several lacerated wounds more or less complicated, cartilaginous quittors, injuries with loss of substance of all kinds, fistulous tracts, chronic abscesses, etc., etc.

This valuable subject is then brought to a close by the following general conclusions:

1—Solution of sugar injected subcutaneously, in the abdominal cavity or in the articulations of animals used for experiments, is reabsorbed in a short time and without giving rise to accident except a slight elevation of the temperature which passes off very rapidly.

The same solution, at a higher degree of concentration, 25% and a temperature of 29°–30°C. can be injected into horses, in the trachea, or in the veins (jugular) with the double advantage of being more rapidly absorbed and yet easily tolerated.

From 500 to 1000 c.c. can be injected every day, without giving rise to any disturbance of the organic functions and more than that if the injections are renewed for several days in succession, a noticeable improvement is observed in the general condition of nutrition and on that account the injection can advantageously take the place of the ordinary injection of physiological serum.

The solution can be made with simple distilled water or in physiological serum by the addition of 250 grammes of sugar for 1000 c.c. and thus a solution of 25% can be obtained.

2—Sugar in powder, applied on any kind of wound or solution of continuity, acting by its absorbing and antiseptic properties gives rise at the same time to an hyperactive nutrition and reparative action on the granulating layer of the wound, which in a short time carries it to rapid and solid cicatrization.

3—Sugar, applied directly to a sutured wound, protects it from any possible infection, thus insuring a first intention cicatrization. Applied upon a wound which has not been closed with sutures and where loss of substance exists, no matter what may be its nature or extension, it promotes rapidly the development of granulations of good appearance and accelerates the process of repair.

4—In general, in operations on the foot, accompanied with more or less loss of substance and especially in the partial or total removal of the sole, treatment with sugar, besides quick cleansing of the wound, activates also the rapid formation of the horny tissue, which can be observed a few days after the surgical interference.

5—Sugar possesses besides, the immense advantage of being a strong deodorizing agent, removing the bad odor that impregnates the dressing, especially in cases of canker of the foot where the odor is characteristic and so truly repulsive.

6—With the sugar treatment the formation of pus is not observed, even in large wounds with or without loss of substance. With the sugar on the contrary, it has been observed that the secretions in the wound diminish from the very beginning of the treatment and would disappear almost entirely.

If a dressing with sugar has been properly applied, it can remain undisturbed without any inconvenience for 8 or 10, or even 12 days.

7—Sugar can be used in solution or in its natural state, as it is found in the stores. It needs no special preparation before use. Consequently it is an excellent material, as useful, as practical, not only on account of its low cost but because it can be found any where at a moment's notice.

8—As to the therapeutic properties that common sugar possesses the author prefers it to glucose because of its fixed character, its low cost, it is easily pulverized and adheres well to the tissues, forming stronger and more compact layers.

9—By its absorbing, antiseptic and cicatrizing properties, sugar represents a therapeutic agent of the first order, which can

render great service in veterinary surgery, especially in private practice, as a substitute for the common antiseptic powders of today.

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CAMPHOR AND TETANUS. That prevention is better than cure, is an old medical saying, which notwithstanding its age and perhaps on its account, is one of necessity at the seat of war.

That tetanus has been relieved and its fearful mortality has been reduced is no doubt due to the extensive use of antitetanic serum injections, whenever these were possible.

But there are circumstances where injections of serum are not possible, when the expected prevention does not take place and it is then that the practitioner thinks of his arsenal of curatives and looks for the ones which are likely to give him the results he desires.

The choice is difficult. Many are the modes of treatment and many the drugs which have been tried. An army veterinary major, Mr. Poret, a great advocate of the preventive qualities of the serum has thought it would be an advantage to find an agent, upon which the practitioner could fall back, as a serious adjunct in the treatment of lockjaw and selecting camphor, he experimented with it. He had a tetanic horse to treat and he injected subcutaneously in this animal 200 grammes of concentrated sterilized camphorated oil, representing 50 grammes a day. In a few days, the disease, which was progressing slowly, improved so much that recovery at short notice, say a few days, was considered imminent.

Was this a simple coincidence, and would the horse have got well without the camphor, was the question?

Fortunately, a second case came. One of lockjaw from a punctured wound of the foot. Serum injections had been given late. The disease had existed three days. Between 200 and 250 grammes of concentrated camphorated oil injected subcutaneously was followed by quick recovery.

Still another case occurred in an establishment where preventive injections were made quite often, on account of the frequency of lockjaw cases. This case was treated with camphorated ether, 5 c.c. of which were injected into the jugular three times a day. He received also 5 c.c. of oil by subcutaneous injections. Chloral was administered per rectum. The result was slow but recovery followed.

Similar results were again recorded in a colt, whose tail had been amputated and which did not have any preventive injection of serum, also another horse which was treated intravenously.

While Poret treated his patients, he observed that the dose of 20 c.c. was the highest the animal could stand and that only when given gradually. High doses gave rise to manifestations, which subsided rapidly, it is true, but could assume alarming characters.

These experiments, which appear in the *Bulletin de la Societe Centrale* were not offered as complete. The treatment was not presented as one with a specific microbian agent, nor as an antitoxic experimentally tested, it was only a therapeutic initiative which after all may prove its usefulness when it has been tested by others. It certainly deserves it.

In the same *compte rendu* of the *Bulletin*, there is another record, an experiment on two horses affected with acute tetanus, where Mr. Lecuyer injected three times a day, in the jugular, 5 c.c. of camphorated ether and under the skin 45 c.c. of the same oil in 8 or 9 doses. Both horses recovered. Why not try it?

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Gaseous Gangrene. This important subject has been the occasion for a valuable communication before the French Academy of Medicine at one of its last sessions. It related to work done by Professor Weinberg and Seguin.

From it, it appears that if the *Bacillus perfringeus* is the most frequent in gaseous gangrene, there are cases where the principal part is acted by other anaerobics, such as the septic vibrio, the *Bacillus edematicus*, etc. More frequently, the severity of the disease depends on microbian associations, which are different according to the cases. That wounds, complicated with gaseous gangrene, end in death or septicemia, death is always due to an intoxication, which in many cases is the result of the simultaneous action of several toxins secreted by the associated pathogenic microbes.

To these microbian poisons, the authors give the name of *cenotoxines* which act in common upon the organism and that of *cenotaxy* to the general intoxication they give rise to.

Weinberg and Seguin have succeeded in preparing sera against the most important microbes of gaseous gangrene. The anti-perfringeus serum, antimicrobian, is useful in the cases where the *B. perfringeus* is the principal agent, providing it is used before septicemia is fully developed. Antiseptic vibrion and anti-edematous sera are antitoxic.

According to the authors, it is difficult to prepare from one animal a serum that will act against all the toxins.

It is not likely that one antipolytoxic serum can be prepared

against gaseous gangrene, as the number of pathogenic microbes found in that disease becomes increasingly greater.

For the authors, it seems the best means to reduce the number of fatal cases of gaseous gangrene is to treat preventively all wounds with a mixed serum, one made of the active sera which are prepared against the microbes known as the most dangerous in that disease.

A. LIAUTARD.

THE PURCHASE OF ARMY MULES IN U. S. A. "It has been stated officially that the Government have had to spend £12,000.000 in America on horses and mules to meet the vast requirements of our armies abroad. This figure history may show to be under rather than over the mark.

Since mule-breeding is not carried on in the United Kingdom, this indispensable beast of transport had to be purchased abroad; but much money expended in America would have been saved to this country had the horse supply been in a less unsatisfactory state than it was at the time the officers of the Remount Department of the War Office had to secure animals for war service. From one firm in the United States the British Remount Commission, under Major-Gen. Sir Frederick Benson, purchased 120,000 mules and 60,000 horses.

Reference is made to the Guyton and Harrington Mule Company Properties, the head-quarters of which are at Kansas City, Mr. J. D. Guyton being president, Mr. W. R. Harrington vice-president, Mr. J. F. Guyton treasurer, and Mr. W. K. Harrington secretary. The company have 500 buyers in the field, and thus it covers practically every State in the Union. Kansas City ranks second as a railroad center in the United States, having thirty-two distinct railroad lines, while it is famous as a hay market (the most important in the States), for agricultural implements, live stock, meat packing, and grain.*****

Some day it will be possible to tell how shrewd calculation and much forethought on the part of the chief of British Remount Commission in America enabled our Government to deal on such an extraordinary big scale in horseflesh, and how the vast purchases were shipped to Europe and other theatres of war. The Guyton and Harrington Company may well be proud of their achievement."—*The Veterinary Record.*

VACCINATION EXPERIMENTS AGAINST ANTHRAX*

ADOLPH EICHHORN, Washington, D. C.

The disease of anthrax is widely spread throughout the world, and it is being recognized as one of the most destructive scourges of live stock in the United States. In certain sections it is more prevalent than in others, particularly in the southern states, and since no determined effort has been made towards its suppression, it appears to be on the increase, its presence is now being recorded in localities where it has never before been recognized.

As the spores of the causative agent of anthrax retain their virulence and remain lodged in the soil in an active state for many years in the infected localities, it is very difficult to prevent the spread of the infection and the eradication of the disease is thereby rendered a most serious problem.

Various factors have to be considered in the prophylactic control of anthrax, such as the prevention of the continued impregnation of the soil with the virus by the proper disposition of the carcasses dead of the disease, the destruction of the virus contained in the soil by its proper drainage and cultivation, and the prevention of outbreaks through the immunization of the susceptible animals.

In order to attain the greatest success in the control and eradication of the disease it appears that the best results can be accomplished only through proper attention to all of the above factors.

The execution of such measures would require the earnest cooperation of the stock owners, but even then, on account of the peculiar geographical conditions of certain parts of the country the drainage and cultivation of the land would not always be feasible, and our efforts must therefore be directed principally towards the sanitary measures and protective vaccination. The enforcement of proper sanitary police regulations in connection with the control of anthrax no doubt would materially effect a reduction of the disease, but unfortunately it is rather a difficult task to obtain the cooperation of the interested parties.

The proper disposition of the infective material, particularly of the dead carcasses, should be considered of the utmost importance, since such material constitutes the greatest source of danger towards

*Presented at the meeting of the A. V. M. A. Section on Sanitary Science and Police, Oakland, Cal. September, 1915.

the spreading of the disease. Drainage from the soil polluted by carcasses dead of anthrax may carry the infection to distant points and deposit the spores over large areas hitherto uninfected. Buzzards and other birds (Dalrymple), dogs, and even flies may also carry the infection from such sources into uninfected localities. Therefore, in an effort to control the disease, an educational propaganda must be carried out and stringent compulsory measures adopted for the proper disposition of the infective material from the premises where the disease appears among the stock.

PROTECTIVE VACCINATION. A material reduction and checking of the disease may be successfully accomplished by periodical vaccination of all stock in infected localities. This method, even if practiced alone, would have splendid results in minimizing the losses from this disease in anthrax localities. However, such vaccination must be carried out regularly and irrespectively of whether the disease has already appeared on the premises or not.

Fortunately, in anthrax, we have at our command various methods of vaccination which have proved highly efficient in the production of immunity. As a matter of fact, this was one of the first infectious diseases in which protective vaccination was successfully demonstrated, and we are indebted to the great Pasteur for devising the procedure of the vaccination for this disease. Pasteur proved that anthrax bacilli when cultivated at a temperature of from 42 to 43°C. will gradually lose their virulence, and also that when removed from such an attenuating temperature and cultivated under normal incubation temperature will not change their pathogenicity. Thus, cultures attenuated for twenty-four days will be pathogenic for mice but not for guinea pigs and rabbits; whereas, if attenuated for only twelve days at the higher temperature they will be virulent for mice and guinea pigs but not for large rabbits. The attenuated cultures will retain their reduced virulence under ordinary conditions and only in very exceptional instances was any increase of virulence observed. This characteristic of the anthrax bacillus led Pasteur to employ the attenuated forms of the anthrax cultures for vaccination purposes. Accordingly, he prepared a more weakened vaccine from cultures which had been attenuated for twenty-four days (premier vaccin) and for a second injection, cultures which had been attenuated only for twelve days (deuxieme vaccin). In the epoch-making demonstration at Pouilly le Fort, before a commission appointed by the French government, he suc-

cessfully demonstrated its effectiveness on sheep and cattle. In this instance the vaccinated animals withstood the injection of virulent anthrax bacilli, whereas the controls died. Since that time vaccination against anthrax by the Pasteur method has been very extensively employed throughout the world. Many millions of animals were vaccinated by this method, and the results in general must be considered very favorable.

At the same time, it must be acknowledged that in vaccination by this method it is essential to have a potent vaccine, and one which is properly tested for its pathogenicity. There are disadvantages in this method of vaccination and these must be given due consideration. The unstable keeping quality of the Pasteur vaccine is a very important factor to be considered. Experience in this line proved that Pasteur vaccine may deteriorate within a very short time after its preparation, and this has also been demonstrated during the work of the Bureau of Animal Industry in the control of the manufacture of biological products, when periodical tests were undertaken with the products of the various manufacturers. In repeated instances a vaccine proved inert within three months of its preparation. At other times, again, it remained potent for a period of a year. This no doubt, is due to the method of preserving and handling the product. When exposed to light and warm temperature it deteriorates very rapidly, and when it is considered that the products of manufacturers are being stored under unfavorable conditions in branch houses and also on the shelves in rural drug stores the loss of potency can be readily explained. For this reason it is aimed in the new regulations of the department of agriculture governing the preparation of biological products to reduce the time limit for the use of Pasteur anthrax vaccine to three months from the date of its preparation.

The injection of an inert product into animals would impart to the stock owners and veterinarians who employ the same a false sense of security, and bring this method of vaccination into disrepute. At times, no doubt, great losses have resulted from the application of inert vaccines.

Other disadvantages of the Pasteur method which must be considered are: first, that it requires two handlings of the animals before immunity is established; second, that the losses from vaccinations are not insignificant; third, that its standardization is not carried out very accurately; and fourth, that the administration

of Pasteur vaccine in herds where the disease has already made its appearance is apt to induce the disease through the reduction of the resistance of the animal during the development of immunity in the process of vaccination, and for this latter reason it is best adapted only in herds in which the disease has not yet appeared.

These deficiencies of the method have been recognized by many investigators who have endeavored to devise other methods of vaccination, and particular attention has been directed towards the preparation of a spore vaccine, because of its superior keeping qualities. In Russia at the present time the method of Zenkowsky, and in Hungary, a spore vaccine prepared by Detre, is being successfully employed; although, aside from its keeping qualities, this product has all the other disadvantages of the Pasteur method. Successful vaccination by spore vaccines was also demonstrated by Nitta, in Japan, and others. Other means of vaccination with attenuated living cultures, aggressins, dead bacteria, etc., were tried but proved of no advantage.

Sobernheim established that injections of increasing amounts of virulent virus into immune animals produced a serum which has great protective value against anthrax. Such protective serum may be produced in the various susceptible animals.

Production of Serum. The animals which are selected for the preparation of serum are subjected to a preliminary treatment either by sero-vaccination or by Pasteur's method, then at certain regular intervals they are infected with increasing doses of virulent anthrax cultures. For this purpose they receive about ten to fourteen days following the preliminary treatment an injection of from 1/200 to 1/1000 of a loopful of virulent culture. In sheep it is advisable to exercise greater care, especially at the first injection of virulent material, when a very small quantity of the culture should be employed, whereas in cattle and horses it is not necessary to employ less than 1/200 of a loopful. The first injection of virulent culture is usually followed by a considerable reaction inasmuch as the animals usually develop a febrile condition which persists for several days. The subsequent inoculations are then carried out at intervals from two to three weeks in such a way that the dose is soon increased to a loopful, then to several loopfuls and then gradually to several agar cultures, and finally to an injection consisting of several large mass cultures. This is quite easily accomplished in cattle and horses and in three to four months the animals may be-

come so tolerant to this injection that they will withstand the subcutaneous inoculations of two to three mass cultures without noteworthy reaction. At times considerably extensive local infiltration may follow the injection which, however, retrogresses within a short time and the general condition of the animals is only slightly influenced. In sheep the immunization causes greater difficulties on account of a greater susceptibility of these animals and it is difficult to prevent a very small percentage of the animals which are being used for serum production from dying in the course of the hyperimmunization. Nevertheless, it is possible even in sheep to produce such an immunity that they will withstand the injection of several mass cultures without reacting.

The more virulent the strain of the anthrax culture which has been used for the treatment of the animals the more care must be exercised in the course of the hyperimmunization, but in that case the anthrax serum would also be more potent. Therefore, it is advisable to use anthrax strains which have been obtained more recently from fatal infections. It is also advisable to use strains of different origin for the immunization. It is immaterial whether bouillon cultures are used or suspensions from agar cultures, but it is more practical to use the latter method for the inoculating material, since in this instance the quantity of fluid to be injected may be limited to a relatively small amount. Quantities of 500 to 1000 c.c. of the bouillon cultures cause, as can be readily seen, considerable technical difficulty for injection, whereas the suspensions from four or five mass cultures may be readily distributed in 50 to 60 c.c. of fluid. Fresh cultures which have been cultivated for about twenty-four hours at 37° are as a rule more suitable for inoculation, whereas older cultures with pronounced spore formations possess no advantages over the young cultures.

The inoculations should be made subcutaneously. Intravenous injections as first employed by Sclavo are less effective. The potency of the anthrax serum is in no way increased by this method of immunization. Besides, there exists the danger of emboli, when in the later stages of the immunization process larger amounts of culture material have to be administered. Animals which have been treated with subcutaneous injections will produce finally an anthrax serum of remarkably high potency.

As a rule, the animals which have received one to two agar cultures show a specific protective action of their serum, but for prac-

tical purposes it is not advisable to use the serum at such a period. As a rule only when the animals stand one-half to one-mass cultures is the potency of the serum sufficiently strong. A similar condition is manifested in animals used for the production of immune sera for other diseases, the individuals showing a varying response to the injection for the production of immune bodies; i.e., an animal will at times produce a potent serum relatively early, whereas another with the same method of treatment will develop a serum of the same potency only after a considerably longer preparatory treatment. Accordingly, from observation it has been noted that sheep produce the most potent serum, and in this species of animals the individual differences are of almost no consequence so that almost every animal produces a good anthrax serum. Horses produce also a potent serum, but in this species single individuals may show great variations. The anthrax serum from cattle is quite potent, but in its protective value it does not equal horse and sheep serum.

Is is best to draw the blood fourteen to sixteen days after the last injection. An earlier bleeding should be avoided. Not infrequently it occurs that animals after an apparent recovery following the inoculation reaction and after a period in which they are free of fever on the eighth or ninth day suddenly develop a rise in temperature. This has been established by Sclavo and Burow. Then again, repeated regular blood examinations showed that at this time and even later, up to the tenth and eleventh days following inoculation, occasional anthrax bacilli may appear in the blood of the animals in greater numbers. The bleeding is carried out in the ordinary way and the blood is collected in large sterilized glass cylinders or similar receptacles of about two or three liters capacity. Seven or eight liters of blood may be drawn from cattle, horses about the same quantity, and sheep about one and one-half liters. After two or three days another bleeding is made. In this instance, however, only a small quantity of blood should be drawn. The animals resist these operations very readily, and after a lapse of fourteen days they are ready for another injection, which is then followed in from fourteen to sixteen days by repeated bleedings. Thus, in the period of a year the same animals may be bled ten to eleven times, and such animals can be used in this way for several years, alternating the injections with the bleedings, provided they are kept in a well-nourished and healthy condition.

In order to obtain the largest possible yield of serum from the

blood drawn into the glass cylinders a weight is attached to the same and released on the clotted blood in about twelve hours after being drawn. The diameter of the weight is about half an inch less than the cylinder and its weight is about two pounds. In about twenty-four hours the clear serum is then siphoned into sterile bottles and preserved with 0.5 per cent of carbolic acid. If proper precautions have been practiced it is not necessary to pass the serum through Berkfeld filters; however, if there is the slightest doubt as to its sterility, it is advisable to filter the serum before bottling. It is advisable to distribute the serum in various-sized brown bottles, which should be securely corked and paraffined.

STANDARDIZATION OF THE SERUM. The testing of the serum must be carried out primarily to determine its potency. It is to be regretted that for this purpose there are no accurate or definite methods known, as it is almost impossible to establish the absolute protective value of the serum, because the animals on which the serum is being tested are so very highly susceptible to the disease. Nevertheless, it is possible to establish a relative value for all practical purposes through laboratory experiments, and some of the investigators believe that rabbits are best adapted for the purpose. The standardization test as recommended by Sobernheim is still employed by various investigators for the determination of the protective value of anthrax serum. This test is carried out as follows:

POTENCY TEST

Rabbit A—2 ccm. immune serum (intravenous)		Follow immediately by a subcutaneous injection of 1/1000 loopful of a suspension of virulent anthrax bacilli in 1 cc. of 0.7 per cent sodium chloride solution.
" B—3 " " " "		
" C—4 " " " "		
" D—5 " " " "		
" E—6 " " " "		
" F—(Control animal)	1/1000 loopful of a suspension of virulent anthrax bacilli in 1 cc. of 0.7 per cent sodium chloride solution.	
" G—(Control animal)		

According to extensive experience, a serum is considered potent and satisfactory for immunization purposes, when, of the five rabbits given the serum at least two remain alive and the others die only later than the control animals. Should more than the two animals remain alive, or even all five, whereas the control animals die in about forty-eight hours, the serum has an extraordinary potency.

It should be noted that it does not follow that those rabbits which receive the smallest serum dose should die, since not infrequently they may remain alive whereas the rabbits receiving larger doses succumb.

This method of standardization has not proven as accurate and reliable as the test recommended by Ascoli, and which has been employed in the experimental work with serum prepared in connection with our experiments.

In this test a twenty-four hour old attenuated bouillon culture is used which is of such a virulence that when introduced subcutaneously in a 0.25 cc. dose into 350-gram guinea pigs it will kill them in from two to three days. These test cultures must be previously standardized in such a way that they will kill guinea pigs which have been twenty-four hours previously injected intraperitoneally with 2 cc. of normal serum. Guinea pigs treated in the same manner and with the same dose of titrated standardized immune blood serum must remain alive.

The testing of the serum is carried out on six guinea pigs, each receiving intraperitoneally 2 cc. of the serum to be tested, and twenty-four hours later the established dose of the test culture is injected subcutaneously in the axillary region. The serum is considered satisfactory for immunization purposes if at least four of the guinea pigs remain alive over six days, whereas the control animals die within three or four days. For protective and curative purposes in man, only such serum should be selected which, by carrying out the same conditions of the test, protect the guinea pig in 0.5 to 1 cc. doses.

Experimental Data. On September 8, 1914, two horses, Nos. 48 and 96, were vaccinated against anthrax according to Pasteur's method. On September 29 these two horses were given approximately 1-100 of a loopful of virulent anthrax bacilli subcutaneously. Horse No. 48 showed no apparent reaction following the injection. Horse No. 96, however developed local anthrax at the point of inoculation. The swelling became enlarged and there was a considerable area of edema below the same. This condition persisted for approximately a week, and finally disappeared. The animal, however, showed no appreciable rise in temperature during this period.

The following chart gives in detail the process of hyperimmunization:

HYPERIMMUNIZATION

Date	Amount of Virus given each horse	Results
9-29-14	1/100 loopful	No apparent reaction in horse 48. Horse 96 developed anthrax at point of inoculation; large swelling; edema of neighboring tissue. Persisted about one week.
10-24-14	1 loopful	No noticeable reaction in either animal.
11-15-14	10 loopfuls	Ditto
12- 9-14	5 cc. of an emul. repre. ½ growth of agar culture	Horse 48 showed temperature of 102.2° the following day; horse 96, 101°. Both animals developed small, hard nodules at point of injection.
12-29-14	20 cc. of emulsion repre. washing of growth from two agar cultures	Both animals developed small abscess at point of inoculation; soon recovered from same.
1-19-15	30 cc. of emulsion; growth from eight agar cultures	No reaction.
2- 6-15	40 cc. of emulsion; growth from two mass cults. from flasks, surf. area 6x2½ inches.	Slight reaction in horse 96. Horse 48 showed quite an intensive reaction, developing a large swelling at point of inoculation; persisted several days.
3- 5-15	50 cc. of emulsion; growth from four mass cultures from flasks, surf. area 6x2½ inches	No apparent reaction.
3-31-15	50 cc. of emulsion; growth from eight mass cultures from flasks, surf. area 6x2½ inches	Slight local reaction in each case.
4-19-15	Ditto	Slight local reaction in each case.
4-28-15	"	Slight rise in temperature in both cases.
5-11-15	"	Slight rise in temperature and local reac.
5-24-15	"	Slight rise in temperature and local reac.
6-12-15	"	Slight local reaction.

In the above work four strains of anthrax bacillus were used—known to us as "Davis", "6071", "Burt", and "Boener"—the first two strains being highly virulent types, and the latter two very much weaker.

In all cases where the larger amounts of anthrax virus were given the injections were made at four to six different points to minimize abscess formation.

It might be well also to state here that the irregularity in the time between injections was due to the fact that this work was interfered with by the outbreak of foot-and-mouth disease in this

country, and for this reason it was also impossible to subject the blood to periodical tests, in order to ascertain its immunizing value at the different intervals between injections. Experience proved that horses may produce highly potent serum following the injection of the first or second mass cultures. It is therefore advisable to subject the blood of the animals to periodical tests for potency throughout the course of immunization.

On June 25, 1915, six liters of blood were drawn from each horse into the glass bleeding cylinders previously described. Since this date these animals have been bled regularly, taking six liters of blood from each horse, giving an injection of virus in the intervals between bleedings.

In standardizing our serum, that taken from each horse was tested separately. The following procedure was carried out: Three series of guinea pigs were inoculated intraperitoneally with varying amounts of serum, and 48 hours later were injected with 0.25 cc. of a 24-hour bouillon subculture of an attenuated strain known as "Davis D". This culture had been attenuated by growing it at a temperature of 42-43°C. for a period of twenty days. Previous tests of this culture showed that it was uniformly pathogenic for guinea pigs, killing them in two to three days, but failed to kill rabbits. The results of this test are contained in the following table:

SERUM No. 48

Serum injected intraperitoneally; virus 24 hours later subcutaneously.

Guinea pig No.	Amt. of serum	Amt. of Virus	Results
1	1.– c.c.	¼ c.c.	Remained alive
2	1.5 c.c.	¼ c.c.	Died on third day
3	2.– c.c.	¼ c.c.	Remained alive
4	2.5 c.c.	¼ c.c.	Remained alive
5	3.– c.c.	¼ c.c.	Remained alive
6	3.5 c.c.	¼ c.c.	Remained alive

SERUM No. 96

Serum injected intraperitoneally; virus 24 hours later subcutaneously.

Guinea pig No.	Amt. of serum	Amt. of Virus	Results
1	1.– c.c.	¼ c.c.	Remained alive
2	1.5 c.c.	¼ c.c.	Remained alive
3	2.– c.c.	¼ c.c.	Died on third day
4	2.5 c.c.	¼ c.c.	Remained alive
5	3.– c.c.	¼ c.c.	Remained alive
6	3.5 c.c.	¼ c.c.	Remained alive

NORMAL HORSE SERUM

Serum injected intraperitoneally; virus 24 hours later subcutaneously.

Guinea pig No.	Amt. of serum	Amt. of Virus	Results
1	1.– c.c.	¼ c.c.	Died on fourth day
2	1.5 c.c.	¼ c.c.	Died on third day
3	2.– c.c.	¼ c.c.	Died on fourth day
4	2.5 c.c.	¼ c.c.	Remained alive
5	3.– c.c.	¼ c.c.	Died on fourth day
6	3.5 c.c.	¼ c.c.	Died on third day

In view of these results it was decided to use the "Davis D" culture in the preparation of our spore vaccine, to be used simultaneously with the serum.

Extensive tests to determine whether or not the immune sera possessed a bactericidal property, proved negative.

PREPARATION OF SPORE VACCINE. The four cultures used for the hyperimmunization of the horses were attenuated at a temperature of 42.5°C. for varying periods. From time to time they were tested for their pathogenicity by inoculation into mice, guinea pigs, and rabbits. The cultures removed from the incubator after twenty days of attenuation proved satisfactory for our purpose, inasmuch as the test inoculation demonstrated their virulence for the mice and guinea pigs but not for rabbits.

For the purpose of producing a spore vaccine it is desirable to use a peptone-free agar media, and after inoculation with the attenuated culture to grow the organism at a temperature of 37.5°C. for four to seven days by which time an abundance of spores will have formed.

The growth is then washed from the slants and collected in a sterile flask and heated to a temperature of 60°C. for one-half hour to destroy the vegetative forms of the organism. A measured quantity of this suspension can then be plated out in the usual manner and the spore content of 1 c.c. of the suspension established. A dilution can then be made to the desired amount for inoculation purposes. Thus, if it is desired to use for vaccination 1,000,000 spores, it is best to dilute the vaccine to a quantity of which 1 c.c. would contain this number. Of such vaccine, 1 c.c. would constitute the dose for cattle and horses, with corresponding smaller doses for calves and sheep.

In all forms of vaccination against anthrax in sheep, the greatest care must be exercised, since these animals are very susceptible to the disease and at times vaccines which have no ill effects on cattle will prove fatal to sheep. Therefore the dose of the spore vaccine for sheep should not be more than one-fourth the amount given cattle.

In the preparation of spore vaccines it is essential to submit every lot to a test for pathogenicity by inoculating approximately one-quarter of a million spores, that is, ¼ c.c. of the standard suspension into guinea pigs and rabbits, before employing the same for vaccination purposes. The guinea pigs should die in from two to five days, whereas the rabbits should remain alive.

In consideration of the keeping qualities of the spore vaccine, large lots can be prepared without fear of deterioration. In the bottling and storing of the same, proper care should be taken to prevent contamination.

Technic of Administration. For immunization purposes by the simultaneous method the serum should be injected first. It is desirable to divide the herd into groups of ten or twelve and inject first each animal of the group with the serum, following this with the injection of the spore vaccine. The serum should be injected on one side, either on the neck or back of the shoulder, and the spore vaccine on the other side; the injections being made subcutaneously.

In herds where the disease has already made its appearance, it is necessary to take temperature measurements in all animals and subject to the simultaneous vaccination only those which show no rise in temperature. All others should be given the serum alone treatment, in doses varying in accordance with the severity of the symptoms manifested by the individual animals. If the examination reveals a considerable number of infections it is advisable to use the serum alone in all animals, and in three or four weeks revaccinate by the simultaneous method.

The dosage should depend on the potency of the serum, serum of a high potency, naturally, being most desirable; thus in some instances serum in 5 c.c. doses for large animals and 3 c.c. for smaller animals, was found to be effective for immunization purposes. Unfortunately all hyperimmune animals do not yield serum of such high potency and for this reason it is obvious that accurate potency tests should be carried out by the producer of the serum.

In the treatment of anthrax, serum should be administered in large doses. An animal showing only a high temperature with no other manifestation of the disease, should be given from 30 to 50 c.c. but if the gravity of the disease is pronounced, 100 c.c. should be administered. In almost every instance a drop in temperature may be observed and a diminishing of the severity of the symptoms. At times, however, a relapse occurs about the second or third day following the serum injection, when it becomes necessary to administer another dose of serum. It has been proven that animals affected with anthrax, even after the bacilli are found in the blood circulation, may recover after an injection of potent serum.

The simultaneous treatment, as in the Pasteur treatment, may at times result in a temperature and systemic reaction in the animals. These manifestations are indicated by elevation of the temperature and sometimes a swelling at the point of inoculation of the spore vaccine. These symptoms, however, are usually of short duration and only in very exceptional cases will they result in the loss of the animal. However, if the reaction following the injection of the spore vaccine threatens the life of the animal, a second injection of serum should be administered.

The anthrax serum injected simultaneously with the vaccine has a counteracting effect upon the reaction which may follow the injection of the spore vaccine during the process of immunization.

At times anaphylactic reactions are observed as a result of the serum injected, especially in cases where the serum is foreign to the animals treated. These manifestations appear as a rule within one-half hour after injection, in the form of urticaria-like eruptions, swelling of the head, slight chills, and rise in temperature. More severe symptoms have also been noted to follow such injections, but almost invariably subside within a few hours.

A series of experiments was conducted at the Bureau experiment station at Bethesda, Maryland, to establish the efficiency of the simultaneous method of anthrax immunization on cattle and sheep.

For this purpose six head of cattle and five sheep were given the simultaneous injection of anthrax serum and spore vaccine. Three weeks subsequent to immunization they were subjected to infection tests which consisted of a subcutaneous administration of ¼-cc. for the cattle and ⅛-cc. for the sheep, of blood from a guinea pig which died from an artificial infection with our most virulent strain of anthrax.

The microscopic examination of the blood of the guinea pig showed it to be heavily charged with anthrax bacilli, but in order to make the test as severe as possible, it was deemed advisable to use such excessive amounts. Three additional cattle and two sheep were used as checks, receiving only the virulent blood. As a result of this infection all animals manifested an elevation of temperature ranging from 103°–107°F. The control animals especially are markedly affected with typical manifestations of anthrax and all succumbed within two to eight days following infection. All but one of the vaccinated sheep succumbed to anthrax, but at a later date than the check animals. Of the immunized cattle a marked temperature reaction was noted, but all of these animals with the exception of a small, undersized, weak calf which died in six days following infection.

While in the above test the sheep succumbed and one of the small calves died of anthrax, nevertheless, the potency of the serum was demonstrated. The excessive virulent blood used for the infection was extraordinary and could not be compared with the amount of virus taken by a susceptible animal in cases of natural infection.

FIELD TESTS. On June 21, 1915, Doctor Ashworth, a Dairy Inspector for the District of Columbia, notified our office that a number of deaths among hogs were occurring on a farm in Maryland just outside of the District. The symptoms described by Dr. Ashworth pointed suspiciously to anthrax.

A visit was made to the Maryland farm the same morning, and after an autopsy on several animals followed by a bacteriological examination, a definite diagnosis of anthrax was established. This was later proven conclusively by animal inoculation tests.

To date, seven shoats and four sows had died of the disease, and three shoats, four sows, and one boar were showing symptoms of anthrax, several of the sick animals manifesting the characteristic edema of the throat region. (It is desired to make particular mention of the boar, a fine pure-bred animal, which was in almost comatose condition, showing a profuse bloody diarrhea, and a temperature of 106°F. One of the six sows was also in a very critical condition.)

On the afternoon of June 21, the affected animals were given injections of the immune serum, the boar receiving 100 cc., the sows 50 cc. and the shoats 30 cc. On the following day a visit was made to the farm to immunize the remaining hogs which as yet had shown no symptoms of the disease. A total of 138 were given protective doses of the serum, the large hogs weighing 75 lbs. or over receiving 10 c.c., and the smaller animals 5 c.c.

Marked improvement was noted in the sick animals that had been treated the day before.

On June 23, another visit was made to the farm. All of the sick animals showed still further improvement. The boar was given 60 c.c. more of immune serum and the sow that had been the sickest was given an additional 30 c.c.

The result of this work was that every affected animal recovered, and up to the present time not a single death from anthrax has been reported in those animals that received protective doses of the serum.

In the fore part of July an outbreak of anthrax was reported from Queen Anne County, Maryland. On July 13 two inspectors from the Bureau were detailed to make an investigation with a view to using our immune serum and spore vaccine in an effort to control the outbreak.

The disease had made its first appearance about one month previous to this time, when a farmer lost a cow from anthrax. A few days later a neighbor on an adjoining farm lost a hog from the disease. Following this, the disease made its appearance on five other farms in the immediate vicinity, the greater percentage of animals stricken, dying of the apoplectic form of the malady.

Animals on some of the farms had been treated with single injections of a commercial vaccine, before the arrival of our inspectors.

Immunization tests were at once started with the Bureau serum and spore vaccine. The results follow:

The animals on six farms where losses had occurred from anthrax were vaccinated; the cattle, horses, and mules receiving 10 c.c. each of serum and 1 c.c. of spore vaccine, except, however, in cases where there was reason to believe an animal might be in the incubative stage of the disease, when the vaccine was omitted and the dose of serum increased. Sheep and hogs on the infected farms were given the serum alone treatment, receiving from 5-10 c.c. each.

The day subsequent to vaccination a mule on one of the farms showed symptoms of anthrax—there was an elevation of temperature and a characteristic swelling on one side of the neck (the side opposite to where vaccine had been injected). This animal was given an injection of 60 c.c. of serum and made a speedy recovery.

In all 399 animals, including horses, mules, cattle, sheep and hogs on farms where the disease had broken out, were treated with the Bureau serum and vaccine. Previous to this an aggregate of 10 cattle, 3 mules and 13 hogs had died of anthrax on these farms. On the morning of the day following vaccination a cow on one of the farms died of anthrax. But exclusive of this, no losses from anthrax have occurred on any of these farms.

Approximately 140 animals on several other infected farms were vaccinated by a representative of the State Live Stock Sanitary Board with a commercial vaccine. Within a day or two following this vaccination three cows and one mule died of anthrax and since then two more cows have died of the disease.

Another opportunity was afforded us to test our serum and vaccine in an outbreak of anthrax in Noxubee County Mississippi, where a number of farms were reported infected with the disease.

A quantity of serum and spore vaccine was furnished, and an inspector detailed from the Bureau Station at Birmingham, Alabama, to conduct the work.

On various farms where the disease had made its appearance, a total of 125 cattle were given the simultaneous treatment against anthrax. Besides three animals which showed symptoms of the disease were given 30 c.c. of serum alone. No deaths from anthrax occurred immediately following or since the vaccination, the affected animals having all recovered from the disease.

USE OF ANTHRAX SERUM IN TREATMENT OF ANTHRAX IN MAN. Extensive data are available on the effectiveness of anthrax serum on the treatment of the disease in man. It is recommended that from 30 to 40 c.c. of serum be injected in three or four different places. Should no improvement follow in 24 hours an addition of from 20 to 30 c.c. of serum should be administered.

In most instances the results are very favorable and this treatment is acknowledged to be superior to any mode of treatment known for this disease.

CONCENTRATION OF SERUM. Experiments are now being conducted with the drying of the immune serum with a view to preparing the same in pellet form. For this purpose the serum has been dried in shallow pans in a serum drying apparatus. After thorough drying it is scraped from the pans, milled into a fine powder, and prepared in a pellet machine into proper-sized pellets. The same procedure is also being employed with the spore vaccine. This procedure would greatly simplify the administration of the serum and vaccine and besides the products would be in a form less apt to deteriorate or become contaminated.

Through fractional saturation of the serum with ammonium sulphate the proteids containing the protective bodies of the serum were successfully precipitated and further work along this line is now being conducted. However, this work and the work on the drying and concentration of the products are still in the experimental stage and it is our aim to properly work out a method most suitable for immunization of animals in the field.

CONCLUSIONS

1. Horses are suitable for the production of highly potent anthrax serum. Serum of such horses should protect large animals in 10 c.c. doses.

2. The use of the serum alone treatment is indicated in cases where the infection has already occurred in a herd. Since the serum confers only a passive immunity it is advisable to revaccinate the herd in from three to five weeks by the simultaneous method.

3. The serum possesses great curative value. Depending on the severity of the infection, the curative dose is from 30 to 100 c.c.; the injection to be repeated if necessary.

4. For the simultaneous treatment, a spore vaccine carefully standardized, is preferable to the ordinary Pasteur vaccine.

5. Spore vaccine should be employed in preference to the Pas-

teur vaccines for immunization with vaccine alone. The possibility of more accurate dosing of the spore vaccine and the better keeping qualities of the same, gives this product a decided advantage over the other.

6. Experiments with concentrated serum and dry spore vaccine are very promising. This method would greatly simplify the vaccination process and also insure the product against subsequent contamination and deterioration.

I was ably assisted in the technical part of this work by Doctor Raymond A. Kelser, Assistant in Pathology and Bacteriology, to whom credit is due for the painstaking and careful execution of the details of the experiments.

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ABSTRACT OF DISCUSSION.

DR. KINSLEY: I think Dr. Eichhorn and the department should be congratulated upon the nearness of the completion of this method for vaccination against anthrax. It appears to be superior to any that we have had before. I also note that it should be used within three months after the date of preparation. If the government can assume and enforce such supervision over our present anthrax vaccine it will certainly be beneficial to those people who live in the anthrax regions. I had an opportunity last summer of studying anthrax in Texas. We found anthrax vaccine in the country drug stores which had been there something over a year. It was cloudy and unfit for use. The state at that time had, I believe, no supervision over the distribution of anthrax vaccine, and I do not recall just what supervision the department had over it, but I do know that in the state there were apparently several centers of anthrax which was the result of the improper use of vaccine, or the use of improper vaccine.

DR. WINTRINGHAM: I would like to ask Dr. Eichhorn to clear up some doubts in my mind regarding the use of the old Pasteur vaccine. I believe we should not vaccinate cattle in that territory where no outbreak of anthrax has occurred, or where the herd has not been threatened, because I believe that such vaccination will possibly contaminate that range. I would like to know if this is possible.

DR. EICHHORN: From my experience, it is advisable to periodically vaccinate, and systematically, all cattle in the anthrax region, and only through such efforts will it be possible to control the disease and protect the masses from anthrax, because if you wait until the disease appears on the premises, it is usually too late and losses cannot be avoided. By the systematic use of vaccine, the losses can be avoided or at least reduced.

DR. GERALD: I have had considerable experience with anthrax. I believe I can answer Dr. Wintringham's question by stating my own experience. This year I have vaccinated something like 10,000 head. I vaccinated 6,000 head on the range where there had never been any anthrax, and on this range we lost two head out of 6,000, using a commercial vaccine.

DR. MAYO: The necessity for anthrax vaccine was forcibly impressed on me in Cuba where it was a common disease, and causes more loss particularly on the sugar plantations after the grinding season begins. The cane is practically all hauled by ox carts, often several yoke of cattle being attached to a cart. It is usually the dry season. The infected animal passed the organisms with the excrement. The drivers use ox goads, and as soon as an ox becomes sick, they prod him along, and also prod others, and it is very readily disseminated, apparently from the inhalation of dust. This is purely theoretical. By calling the attention of the plantation owners to the importance of vaccinating all the working cattle before the beginning of the grinding season, the mortality was reduced to a comparatively small amount.

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COCCIDIOSIS IN CATTLE AND CARABAOS IN THE PHILIPPINE ISLANDS AND ITS RELATION TO RINDERPEST*

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Severe outbreaks of Rinderpest occur every few years in different provinces of the Philippines, in spite of all the preventive measures that have from time to time been enforced. During my stay in the Islands I was veterinarian on the staff of the Insular Bureau of Agriculture in Manila, first as assistant in the laboratory for veterinary research at Alabang, Rizal, near Manila; later, in charge of infected Rinderpest territory; and finally, from February until October, 1914, conducting experiments relating to the cultivation of Rinderpest-virus at the Bureau of Science in Manila.

These different assignments provided unusually favorable opportunities for scientific study of Rinderpest, as produced by inoculation of experimental animals and at immunization stations, as well as in outbreaks in the field. Rinderpest in experimental animals was usually produced by subcutaneous inoculation of a greater or

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less quantity of virulent blood in sterile potassium citrate or normal salt solution. The blood was obtained from animals (cattle or carabaos) that were in the early febrile stage of the disease. It is well known that experimental animals show a marked variation of susceptibility to the contagion. (Rodgers[1] 1901; Wooley[2] 1906; Ruediger[3] 1909.)

The symptoms of developed cases of the disease are quite constant and reports of many observers in many countries correspond reasonably well. The description given by Wooley[2] is very clear and comprehensive. Maherley's[4] articles although written in 1897 furnish one of the best descriptions written in English and cover all phases of the subject. Hutyra and Marek's Text Book[5] also contains an exceedingly well written article on Rinderpest.

During the first days of the febrile period, the animals often show marked constipation, feces are passed scantily, formed into hard, dry masses or balls, covered with a distinct layer of mucus, often, but not always, streaked with blood. Animals that die during the first few days show no diarrhea.

In the large majority of cases, certainly in all that live more than six days, this period of constipation is followed by the more or less severe diarrhea and dysentery. When diarrhea begins, thick flakes of mucus pass out, the odor is not particularly offensive and color is nearly normal. As soon as the secretory glands of the intestinal tract become seriously involved, the discharges change from slimy to watery, and are peculiarly grayish and offensive. In robust, well fed animals, before the bowels are exhausted, great masses of mucus, formed into large croupous, gelatinous membranes are passed. At times these are pale yellowish, transparent; they are readily picked up and can be rinsed in water and small selected particles examined under the microscope. These will be found to be teeming with agamonous division forms of coccidia. In the early stages of severe acute attacks, great numbers of sporozoites may readily be distinguished. I have found these protozoan parasites in immense numbers in the discharges of all cases of so-called Rinderpest which I have examined, in the Philippines, in several places in China and in chronic carriers in Japan. The severe type of diarrhea soon causes great weakness and emaciation; mucus appears in small flakes or irregularly formed particles only, shreds of tissue are passed, discharge becomes grayish and always, in severe cases, offensive. In chronic cases it is never sanguinous,

while in acute and moderately acute cases it may be tinged by blood or blood-clots may be expelled. Careful investigation usually shows that these clots are composed of masses of mucus, stained by blood escaping from the injured mucosa. Hutyra and Marek[5] give a good description of them.

The only cases of Rinderpest where I have not been able to demonstrate coccidia in great numbers, were a few peracute cases, in which no lesions were found in the fourth stomach, but where the entire mucosa of large parts of the small intestines had separated from its basement membranes, was loaded up with blood coagula and ingesta, forming long cylinders, corresponding to the lumen of the bowel. Other animals in the group, that lived longer, invariably showed the familiar forms of coccidia. It is difficult to distinguish the smallest forms in certain stages of development and when agamonous division of schizonts is very rapid their outline is indistinct. Such cases were found among carabaos that had been immunized by the simultaneous method about eight months before and were used as work animals on Rinderpest infected fields and pastures of the Calamba Sugar Estate, 50 km. south of Manila, Luzon, P. I., during the summer of 1914.

History, as well as early symptoms of these animals, would indicate beyond a doubt, so-called Rinderpest; temperature and behavior were characteristic and corresponded to the rapid propagation of the virus in the blood. Hutyra and Marek[5] say that the early symptoms are due to this cause. A few of the carabaos died before diarrhea set in and feces were found formed into hard round masses covered with blood, in the colon and rectum.

During experiments which I was called upon to execute at the Pandacan Quarantine Station in Manila, four animals were inoculated with very small quantities of virulent Rinderpest blood to determine the least amount that would transmit the disease.

The virulent Rinderpest blood was taken from a case of inoculation Rinderpest No. 3690, on the fifth day after it had received 10 cm. of citrated Rinderpest blood subcutaneously. When the blood was obtained from No. 3690, the animal was drowsy, ears hanging down, eating very little, slight discharge from nose appeared, morning temperature 40° C., evening temperature 41° C. Subsequently it passed through a very severe characteristic attack of so-called Rinderpest.

The experiments were begun on February 22, 1914, in sheds reserved for this purpose at the Pandacan Quarantine Station.

1st: A susceptible strong Dalupiri bull contracted the disease when injected with 1/100 ccm. of virulent Rinderpest blood (diluted). Discharge from eyes, nose and diarrhea were typical. Coccidia began to appear with the beginning of diarrhea; disappeared on recovery. Recovered, but proved susceptible to a subsequent injection of 5 ccm. of virulent blood (citrated) on March 28th. Recovered again, however. During this second attack, all symptoms appeared in well defined form.

2nd: A susceptible Fuga cow (smaller animal) showed a typical attack of Rinderpest after receiving a subcutaneous injection of 1/10,000 ccm. of virulent Rinderpest blood (diluted). Injected eyes, discharge from nose and mouth, dry scaly skin eruption on neck and forequarters, temperatures of 39.5° to 40°, abdominal pain (cramps), diarrhea and dysenteric, slimy discharges. Coccidia appeared in evacuations in immense numbers. Died on 19th day. Lesions characteristic.

3rd: Another susceptible Dalupiri bull, a very robust animal, received 1/1,000,000 ccm. virulent Rinderpest blood (diluted) subcutaneously. It developed a moderate attack of Rinderpest; highest temperature 39.8° to 40° on the 12th and 13th days; anorexia; drowsy; discharge from nose, injected eyes; diarrhea during a few days only, when feces were dark colored and offensive. Coccidia in great numbers; later marked drooling. Good recovery in about 16 days.

As a result of a subsequent subcutaneous injection of 10 ccm. virulent Rinderpest blood (citrated) on March 28th, animal died on 17th of April from a typical attack of Rinderpest. Lesions characteristic.

4th: Another susceptible Fuga cow, neat, nervous animal, received 1/100,000,000 ccm. of virulent Rinderpest blood (diluted) subcutaneously and developed a typical attack of Rinderpest. Injected eyes, frequent urination, moderate diarrhea, discharge was offensive, blood and mucus in feces, coccidia in masses; discharge from nose and drowsy appearance; marked distress. Made good but slow recovery in about 20 days; was greatly emaciated.

Injected with 10 ccm. virulent Rinderpest blood (citrated) on March 28th, animal showed slight diarrhea, diminished appetite, nasal discharge, temperature of 39.6°. It died from acute bloat, due to indigestion, on April 17th. No marked lesions characteristic of Rinderpest were found on post-mortem examination of the carcass; emaciated, however; tissues bright and clear.

These experiments demonstrate, that the contagion exists in minute form in the blood of animals during the febrile stage of Rinderpest and that minute quantities may transmit the disease. The

small amounts were obtained by diluting 1 ccm. virulent Rinderpest blood with increasing amounts of physiological salt solution and were carefully injected with sterile, close fitting Record syringes.

Subsequent attacks due to much larger quantities of virus speak for an amount of virulent material resulting in super-infection, a condition characteristic of protozoan diseases (Malaria, Texas Fever).

The time between the first injection of virulent blood on February 22nd and the second injection, March 28th, was too short. The complicated processes occurring in the tissues and hemogenetic organs resulting in the production of anti-bodies are not well understood; it has been observed, however, that active immunity or greatly increased resistance is acquired slowly. Schilling[6].

The discharges from the eyes, the nose and the bowels were characteristic and changed with the course of the disease. In diarrheal and dysenteric mucous discharges, coccidia could invariably be found in immense numbers, often several hundred in a microscopic field. Mucus was obtained by washing the fecal discharges and fresh material was examined with 1/6 objective. Mucus may be passed through fixing fluids (Zenker's or Bichro-acetic) washed and preserved in 5-10% Formalin solution.

After studying a great number of so-called cases of Rinderpest in many localities, I looked carefully through available literature and found that many observers, Eustace Montgomery[7], A. Balfour[8], Hutyra and Marek[5] state, that symptoms and lesions of Rinderpest and Coccidiosis are similar, often identical. The descriptions as found in several of the best text-books on veterinary science usually correspond. In Hutyra and Marek[5], Volume I, p. 248, under "Differential Diagnosis" between Rinderpest and Coccidiosis, we find the statement that:

"Excreta retain their original color for a longer period in Coccidiosis than in Rinderpest, but may become mixed with blood even at the beginning of the attack."

Further we find the statement that:

"Coccidiosis remains exclusively confined to the intestinal tract and in older animals the rectum is the seat of severe lesions."

Whereas:

"the mucous membranes of the nose, mouth and eye remain normal."

A further statement says that the disease (Coccidiosis) is not contagious, and

"4° cannot be transmitted even by inoculations."

The first assertion is not important and requires no specific answer.

The second and third statements are contradicted by all observers of Coccidiosis in rabbits, cats, hogs, chickens and other birds, Basset[9], (1909), Fantham[10] (1910). Sussman [19] (1912), says that usually coccidian Rhinitis in rabbits appears as a sequel to coccidiosis of the intestines or liver.

Brugge, Warringholtz und Stieg[12] (1909) furnish a good description of coccidiosis in cattle. They also quote Zürn (1878), from whose original article they publish important parts. Zürn's article is very interesting, because it is the first publication on Coccidiosis—Red Dysentery—in cattle. His post-mortem notes give a splendid description of lesions as found in animals dead from acute gastro-intestinal coccidiosis. He carefully mentions the changes on the nasal mucosa, the pharynx, the trachea and the eyes. Zürn[13] (1878), wrote:

"During life the diseased animal showed marked weakness, they were languid, laid down a great deal; when they attempted to move their gait was unsteady; emaciation increased gradually, the coat was staring; the eyes sunken, between the lids and conjunctivae smeary slime collected; slimy discharge from the nose, weak cough; moderate fever; respiration was normal, appetite capricious, intermittent diarrheal and offensive evacuations from the bowels; tucked up abdomen.

Microscopic examination of parts of intestines demonstrated a serious enteritis due to gregarines. The psorosperms were found in immense numbers in the solitary follicles of the small intestines and even in the enlarged mesenterial glands."

The process, due to coccidia was evidently not confined to the intestinal tract.

The rectum may or may not be the seat of severe lesions; in severe attacks of coccidiosis, the protozoan can readily be demonstrated wherever lesions are found, in the conjunctival sacs, the nasal discharge or in the structures of the intestinal walls and contents.

The experiments described above show that coccidiosis can readily be transmitted by blood inoculations, provided the blood is taken from an animal during the febrile stage, when the virus multiplies rapidly in the blood vascular system. Protozoa go through a more or less fixed life-cycle and the period during which the blood is secured determines its virulency. Veterinarians in charge of im-

munization-stations in the Islands have a great deal of practical experience on this point. It is well known that when blood is secured too late, a larger quantity of it is required to transmit the disease. This is due to the fact, that the protozoan has passed out of that stage of its development where it can multiply rapidly in the blood.

These observations prove that even the fourth assertion of Hutyra and Marek is not correct. Whenever susceptible cattle or carabaos are subjected to simultaneous inoculations of virulent Rinderpest blood and anti-Rinderpest serum, they invariably show the symptoms mentioned above. In all cases of constipation, diarrhea or dysentery resulting from these blood injections, coccidia can be demonstrated with facility in great numbers. In cases that recover, agamonous forms become gradually less numerous; in severe cases they persist.

Observers agree that post-mortem lesions as well as symptoms are practically identical, and that in both diseases marked deviations occur.

Balfour[14] (1911) reported from Egypt that he was called to see cattle at Kodack, on the White Nile. The animals were suffering from what certainly appeared to be Rinderpest. On revisiting Kodack he found a small herd of sick cattle, which were weak, anemic and appeared to have a mild attack of Rinderpest. Some had died Goats with them were found to be infected with coccidia. In the light of these facts (and timely warning issued by Montgomery), it appears that the cattle at Kodack which appeared to have Rinderpest may very well have been suffering from coccidiosis.

Coccidia can readily be demonstrated in the discharges from nose and eyes in animals showing these symptoms in Rinderpest, by the same simple methods that would be used to identify the protozoan parasites in rabbits or fowl.

The description of lesions and symptoms of Coccidian enteritis in cattle as found in Law's[15] text-book describes the great majority of acute cases of Rinderpest correctly. On the other hand, if you desire a detailed description of symptoms of acute coccidiosis, read the article on Rinderpest in Hutyra and Marek[5].

During December, 1914, I visited the Immunization Station at Mexico, Pampanga, P. I., where carabaos were subjected to simul taneous immunization against Rinderpest on a large scale. Several hundred animals were subjected to the treatment every week; Dr. John R. Burns, the veterinarian in charge has had a great deal of

experience in this kind of work. When a susceptible animal, which showed high temperature and beginning of severe diarrhea—caused by injection of virulent Rinderpest blood sent out from the Laboratory at Alabang—was exsanguinated, the stomach showed hyperemic areas and diffuse inflammation of the mucosa. In parts of the rectum beginning desquamation of the epithelium could already be observed. In fresh material from all the lesions sporozoites and schizonts could be found in great numbers.

In the thick secretions from the inflamed eyes of severe carabaos that were examined, schizonts in different stages of development could often be recognized.

The nasal mucous membrane, as well as the folds of the post-pharyngeal regions in different species of animals often show severe invasions by coccidia. They are commonly found as schizonts, round or oval bodies, in different stages of development, and appear to multiply rapidly, not only in the epithelial cells, but in albuminous secretions that are moist or semi-fluid, (intestinal casts, mucus flakes, etc.). At first the nasal discharge is serous, then it becomes mucoid, whitish, thick, even streaked with blood. Its character may also be influenced by a multitude of secondary invaders. The respiration may become difficult because coccidia begin to develop in the bronchioles and lung tissue.

Evidently the virus is carried throughout the organs by the blood and the protozoa develop wherever suitable environment is found: they require oxygen. This explains why coccidia have been found on the pleurae, in the lungs and many other organs. Basset[9], R. Metzner[16], anonymous article in Progrès Vétérinaire 1912 La coccidie du Dindon[17].

Rinderpest in the Philippines disappears during the dry season and reappears soon after the rains begin. Certain sections (Pampanga, for example) are never entirely free. Animals kept and pastured on the fields of Pandacan Quarantine Station located in a bend of the Pasig river, near Manila, showed no evidence of coccidian infection during the dry season of 1914. A few weeks after the rains began, however, the same animals, running on the same pastures, showed constipation, feces were formed into round hard masses, covered with more or less mucus. In some instances, large flakes of mucus were passed, a simple microscopic examination of this mucus never failed to demonstrate great numbers of merozites or schizonts in different stages of development. In a series of ob-

servations extending over say ten days, all the forms of the coccidian life-cycle, with the exception of oocysts could be observed. This corresponds to the reports on coccidiosis as observed by Balfour[8] and Montgomery[7] in Africa. Cattle, carabaos, goats, sheep, horses and chickens were afflicted, showing the disease in its chronic form. All these animals were carriers, having evidently taken up the parasites in limited quantities, on infected pastures and being accustomed to their presence in their alimentary tract, they showed no grave symptoms.

A great number of animals from different parts of the Islands were observed, often on the day that they left the steamer which brought them to Manila. The common symptom was constipation; feces being in the shape of hard, dry, oblong or roundish balls or discs, covered with mucus, often streaked with blood. Occasionally an animal was observed during a diarrheal period, when the last part which passed out was composed of slimy mucus in which roundish or pear-shaped, well formed, ivory white firm lumps of mucus, 1 or 2 cm. long and half as thick, were found. The microscope showed that these contained no cellular structures, but were composed of masses of round or oblong bodies with more or less distinct outlines and a denser round central zone—schizonts in all stages of development. These more or less pear-shaped lumps have often been mentioned and considered characteristic of Rinderpest. Schizonts in this stage resemble ova of oxyuris, but are invariably of different sizes.

Instances where so-called Rinderpest has been carried into clean herds by fodder cut on infected fields have been observed several times.

In 1913, Rinderpest appeared suddenly in two dairies on Calle Alix in Manila a few days after the cows—previously fed on hay—were supplied with grass cut on wet fields. In one dairy, 24 animals out of 26 died. These milk-cows were valuable Australian animals, known to be very sensitive, and therefore kept well isolated. All circumstances point to a common source of infection—the green grass from infected fields.

Soon after the beginning of the rainy season, about July, 1913, guinea-grass (Panicum maximum) was cut in the fields of the Pandacan Quarantine Station, loaded into canoes, taken down the Pasig river to the launch that made regular trips to the Matadero at Sisiman, where Australian cattle are kept in quarantine until they

are slaughtered. The distance from Manila across the bay is approximately 30 miles. None of the men employed at Pandacan accompanied the shipment. The Australian cattle proved to be very susceptible, many became sick about the fourth day after eating the fresh grass. Several died. Diagnosis established from symptoms and lesions by the veterinarian in charge: Rinderpest, acute form. Cause: infected grass, cut in fields that had been fertilized heavily with manure from cattle that were being immunized against Rinderpest. The Doctor stopped feeding forage from the Pandacan fields at once and without other measures the sick animals improved and the outbreak was checked. Detail history and post-mortem reports relating to these two outbreaks can be found in the files of the Insular Bureau of Agriculture in Manila.

Similar observations have been made in Shanghai. Keylock[18] (1909) reports that Rinderpest which is endemic in the coast region and river deltas of China, is brought into the dairies by means of feeding materials, oilcake meal and rice straw. In fact, he says, there is no other way than the latter to account for some of the outbreaks of the disease in local dairies.

Coccidia are evidently only facultative parasites. They develop during the warm moist weather, dry out, assume resistant form and lay dormant, probably in sporelike form until placed in favorable environment—as in the intestinal tract of ruminants. Outbreaks that occur in northern China and Manchuria in winter, when the country is covered with several feet of ice and snow, and when cattle are seldom moved from place to place, are due to infected fodder. The protozoa developed during hot, moist summer weather, adhered to the forage plants when they were gathered, remained dormant until fed to animals in winter and reproduced the disease if the new host was not resistant to their development.

The best places to study coccidiosis in its chronic form are the cattle pens and killing beds of the abattoirs in Shanghai. About 75% of the Chinese cattle shipped to the Shanghai abattoirs are afflicted. I am indebted to Dr. Arthur M. Stanley, Chief Health Officer of Shanghai, for permission to examine cattle and pens in the slaughter-house in the International Concessions *ad libitum*. The authorities of the French Concession readily granted permission to visit the abattoirs and cattle sheds in their Concession; in this place observations could be made on Chinese buffaloes (carabaos) which were slaughtered according to Mohamedan rites.

Coccidiosis must therefore be regarded as extensively distributed throughout the coast region of China and Manchuria, affecting not only cattle and buffaloes, but also sheep, goats, deers, hogs, chickens, ducks, geese and many species of wild animals.

Upon my return to the Pacific Coast in April, 1915, reports soon reached me that in many localities young stock had died under mysterious circumstances. Some stock owners thought that the animals were poisoned. Veterinarians were not able to identify the cause of the losses—which appeared to be due to a complication of diseases; hemorrhagic septicemia, malignant catarrhal fever, symptomatic anthrax, all were considered as possible factors.

Knowing that Manchurian corn has been imported in ever increasing quantities during the last three years, and that corn, oil and bean-cakes come from highly infected territories, my curiosity was at once aroused.

The fact that a great number of the cattle in our dairies were constipated and showed, during certain periods, feces heavily coated with mucus, even tinged with blood, attracted attention at once. Occasionally animals with intermittent attacks of slimy diarrhea were found. The microscope invariably demonstrated the well known forms of coccidia—identical to those that had been observed so often in Far Eastern countries. In all the dairies where the bulls are kept penned up and fed on alfalfa hay from the irrigated districts of eastern Washington, these animals were severely afflicted. A visit to local stockyards solved that puzzle. When a trainload of steers from the irrigated districts around Toppenish was unloaded, many animals showed the characteristic constipation and hard, dry, caked feces, covered with heavy layers of mucus. Microscope showed coccidia in the form of merozoites and schizonts in great numbers.

Evidently the irrigated districts, subjected to cold winters and hot summers, supplied with a liberal amount of moisture during the growing period of alfalfa, have become infected and present favorable environment for the multiplication of the protozoa.

Doeflein[19] says that many protozoa have a remarkable ability to overcome unfavorable circumstances. Often a period of rapid division ends with the production of an encysted zygote, which is able to multiply only after a drying out (resting) period. When the required moisture is again supplied, a new period of rapid division begins. A large number of this type of protected zygotes

can, under favorable conditions, produce an immense number of sporelike, resistant individuals, ready to infect new hosts.

I believe that to this peculiar ability to adapt themselves to circumstances, must we ascribe the sudden appearance and maintenance of virulent coccidiosis among our domestic animals. Textbooks are silent on this important phase of multiplication and development of coccidia in nature. We are ignorant.

After observing chronic forms of coccidiosis, and securing specimens for reference and comparison with those from the Philippines and China, opportunity presented itself to study a local outbreak.

In the vicinity of Alder, on the Tacoma and Eastern R. R., cattle died from this unknown cause during the spring and summer of 1915. The first animal attacked was a family cow, brought into the camp and fed on eastern Washington alfalfa hay and Manchurian corn. The animal was very sick last fall, but recovered. It was moved out to a pasture where calves were kept. Another family cow, kept on the same pasture then became sick (Mr. M.'s cow.) It recovered. Then the disease appeared among Mr. R.'s cattle, three miles away. Stock in the vicinity of Alder runs at large in the woods and on logged-off lands. Water is plentiful during the wet season, but mostly limited to surface water in low places during the summer months. Only cows appeared to be affected so far; one of Mr. R.'s died. Next Mr. M.'s animals were observed to be sick. The cows were very sick, milk secretion ceased, suckling calves died (the calves run out with the cows). From this on the outbreak spread to different groups of cattle. It was observed that cattle that frequented a certain water-hole (blasted out to catch surface water for use in logging engines) became sick. Mr. Sb's cattle are said to have become infected in this way. Cattle that were sick stopped eating, appeared drowsy, were quiet; diarrhea with mucus and bloody streaks were observed in all cases. Frequently the animals had been sick several days before they were taken up; several succumbed so rapidly that they did not lose flesh; they simply died three or four days after they were observed to be sick. When they passed over the critical period, recovery was rapid. Some had no fever. The eyes appeared injected and inflamed, discharge from nose was serous at first but soon became thick and slimy; drooling was a frequent symptom, ulcerations on lips and dental pads were noted in several cases. The discharge from

the nose was often streaked with blood or showed a reddish tinge. In animals that suffered from severe diarrhea, large pieces that looked like pieces of intestines passed out (3″–5″ long, about 1″ in diameter); also large blood-clots. Some animals simply laid down and died or got well, one rancher assured me.

Specimens secured from feces of a gentle range cow and a steer—both animals having passed through a severe attack of the disease, showed coccidia in the mucus flakes. From feces near the water-hole in question, as well as from surface scum of aquatic plants, cultures showing coccidia in great numbers, were obtained. No post-mortem examinations could be made.

During routine work, while examining a well kept, large dairy herd near Seattle, I observed that a great number of cows passed feces heavily coated with mucus; some animals showed slight, chronic diarrhea, others constipation. Young animals had been attacked by what was accepted as hemorrhagic septicemia during February; one young heifer died, one was killed and one recovered. Manchurian corn was ground and fed from the beginning of January; it was very dusty and of poor quality, but cheaper than American corn. The rations consisted of eastern Washington alfalfa, hay, ground Manchurian corn and ensilage.

Within a month after beginning to feed the Manchurian corn, the three young heifers became sick. The outbreak occurred during freezing weather and could not be blamed on infected pastures.

In July, other pure bred calves were seriously afflicted. When examined, the bull calf had been sick five days; temperature 105°, difficult breathing, grits its teeth, anorexia, slight drooling, copious nasal discharge, slimy, thick, yellowish or white, not tinged with blood; bowels rather constipated, but little peristaltic movement, abdomen tucked up; feces formed into soft dark masses or discs, covered with heavy layer of mucus; every passage showed a mucoid, slimy, thin, transparent last part. The condition of the calf had improved slightly during the last twelve hours, but it was still in a serious condition. It drank milk and water.

A heifer calf had a temperature of 108°, was very weak, showed copious thick, slimy, whitish nasal discharge, occasionally slightly streaked with blood; deep erosions in nasal mucous membranes; did not drool as much as its mate. Abdomen tucked up, calf showed pain, at times it was quite restless. It suffered from severe muco-sanguinous dysentery; croupous membranes and large masses

of blood-tinged mucus being passed frequently. No skin eruption could be noted. Condition critical.

History showed that as long as the calves were pastured on the hill they were in splendid condition. The dairy cows—which were severely infected with coccidia, several showing occasionally blood-covered feces—were turned out into a small pasture near the barn over night. They were driven somewhere else and the calves were brought from the hill and turned into the cow pasture. After being on this infected ground—a small brook running through it, forming many small pools of stagnant water—for about three weeks, the disease made its appearance after three weeks of hot weather,—evidently due to the infection carried by the cows (chronic carriers of coccidia) into the moist and wet ground along the stream where coccidia found favorable conditions for development and from where they were taken up by the calves drinking and cropping close the green plants on the moist soil.

Examination of other calves showed other cases, not so serious, that had been overlooked: constipation, covered or slimy feces, slight nasal discharge, rapid, shallow breathing.

Young bulls were kept in a small pasture below the calves, the same brook running through it. Many of these animals showed distinct nasal discharge—some more, some less—a few showed only clear serous discharge and slight drooling.

Careful microscopic examination of the material collected from the calves and from a particularly severely affected cow demonstrated more masses of coccidia—merozoites and schizonts, in the intestinal discharges as well as in the slime from the nose.

The diagnosis was therefore established as coccidian intestinal catarrh in the cows, and coccidian gastro-enteritis, with complication of the upper air passages and lungs, acute type, in the two calves.

Three other outbreaks of the same disease have been investigated—two near Tacoma, and one near Seattle; history and symptoms correspond and the same diagnosis was made, being duly supported by careful microscopic examinations. It is an easy matter to collect specimens, but care and time are required for careful laboratory examinations.

Letters from many parts of the Sound country have reached me, all reporting losses due to some new and therefore mysterious disease. Rough estimates would place the losses among young stock

during this spring and summer at several hundred animals. If the moist pastures and climatic conditions provide environment favorable for propagation of coccidia, severe outbreaks of this serious, dangerous disease must be looked for among our valuable herds of ruminants. The disease began to appear about four years ago, and appears to be disseminated and causes serious losses, especially among young animals throughout the western parts of the state.

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ABSTRACT OF DISCUSSION.

DR. EICHHORN: Our knowledge regarding rinderpest is based entirely upon the observation and research work of scientists who have devoted much study to the subject. We have accepted rinderpest as being caused by the ultravisible virus and now it is claimed by Dr. Schultz it is caused by coccidium. He claims that the coccidium is found in the blood; that is, in certain stages of so-called rinderpest the blood is ineffective as a result of the appearance of the coccidia. I think this is very important, and the case becomes still more important for the livestock industry and the veterinarians of the country since he claims that we have the disease in the United States. This is of vital effect to the stock industry, and it is remarkable that no one ever gave this matter a thought in the work on infectious diseases, if it is found that we have a disease resembling rinderpest as described and discovered in the various countries of the world where the disease occurs. Of course, I am not myself an authority on rinderpest. I never saw a case except in museums, but it certainly would be interesting if some one here who had seen rinderpest and examined it would discuss it. It certainly would be of great importance. But I doubt whether rinderpest which is thought not to exist in this country is identical with the disease which Dr. Schultz found in Washington.

DR. K. F. MEYER: I have seen coccidiosis and I have seen rinderpest, the latter in Africa. Coccidiosis has been observed by myself in Switzerland and there it always has been, and is being considered as a mild intestinal infection. We have seen cases with severe diarrhea; under proper treatment they always return more or less to a condition so they can be used afterwards for slaughter. In such cases I have made a very careful examination of the feces and I have never found bodies which could be considered as agamonts, or gamonts. In some epithelial cells, elements suggesting development stages of coccidia were noticed but could not with certainty be identified as such. In all cases we found the cocysts and spore stages of the life cycle of the coccidium. We have to keep in mind that the coccidia are epithelial cell-parasites, and that their entire cycle is passed inside the cells, particularly is that the case with the agamonts. When the asexual development has exhausted the parasite, the sexual development leads to those elements we can detect in the feces or discharges. We have an elimination of those elements which are capable of reinfection and distribution of the parasites. During the asexual development the most severe symptoms are recorded. The liberation of "paroxysmal" toxins which are set free at every schizogony of the agamonts cause the systemic disturbances. I have never seen that these conditions are due to the parasites being actually carried into the blood, so that we have merozoites in the blood, as Dr. Schultz claims to have observed.

Numerous statements in the literature that coccidia enter the blood stream refer to cold blooded animals only, or to observations which can easily be proven by a skilled protozoologist to be incorrect. I have never seen any report concerning the findings of development stages of coccidia in the blood stream of cattle, and to again repeat: in my prolonged study of coccidiosis of cattle in Switzerland I have never observed any elements which would at least suggest such an explanation.

It is an easy matter to mistake plant cells or other debris in the feces of cattle or animals in general, for coccidia. I have had students who associated the always present yeast cells in feces with coccidia. I recall the statement made in 1910 in the eastern part of the United States; that coccidia can be found in every animal. The diagnosis was made on preparations stained for tubercle bacilli, and all the oval bodies stained reddish were identified as coccidia. That these bodies had nothing to do with these parasties was easily proven, but it is another example to show how easily mistakes are made and how careful one should be in the microscopic diagnosis of coccidiosis or allied infections.

I will not deny that coccidiosis exists to a certain degree in the United States, but it is an infection which does not lead to the death of the animals, just as we observe, accidentally, coccidiosis in the dog and in the cat.

Rinderpest is caused by a filterable virus and there is no question but that conditions, to which I shall briefly refer, exist also in this infection which may possibly explain the findings of Dr. Shultz.

We noticed in South Africa that animals suffering from chronic or latent piroplasma-infections have always had a severe relapse to which they frequently succumbed when infected by a filterable virus, like horse-sickness, heart-sickness or rinderpest. The usual blood examination will be negative until the relapse takes place. We are dealing, in these conditions, with a carefully adjusted equilibrium between immune bodies and protozoan; as soon as this adjustment is disturbed through a new factor, in our case, the infection with a filterable virus or a bacterial cause, the protozoa are no longer controlled in their development, and the clinical picture of a relapse is evident. For the same reasons, it is not surprising to find marked symptoms and positive findings of cocysts of coccidia in the feces of Philippine cattle when they are suffering from rinderpest. In all probability these animals harbored the coccidia in the intestinal tract, and before the rinderpest infection took place were harmless for the animal. Such conditions exist in Central Africa and can probably be found elsewhere.

I therefore consider it absolutely unwise—for the reasons just mentioned—to insinuate that rinderpest is a form of coccidiosis.

I will not deny that Dr. Schultz has seen rinderpest and has proven that coccidiosis exists in the Philippine Islands and also in

the state of Washington, but further careful experiments have to be made before the conclusions can be drawn that both diseases are identical. Numerous publications have, from time to time, appeared in the literature in which coccidia were claimed to be the cause of such-and-such a disease. I cannot recall having ever seen one of these reports confirmed.

DR. SCHULTZ: It is very fortunate and I am very glad that Dr. Meyer has passed judgment and has explained himself so pointedly. In the first place he says that the quotations from literature are old. After I left the Bureau of Agriculture in Manila I spent three months reading and comparing the different articles on this subject, because I knew that the Library of the Bureau of Science in Manila was better equipped and more complete than we have here. Appended to this article you will find a list of 19 publications relating to this subject. I have a comprehensive knowledge of the literature relating to coccidiosis, and am especially familiar with the articles of Guillebeau and Schaudinn, as well as Hess, Zschokke and Zueblin. After considering all these sources I advanced my deductions. I have read Hadley's and Fantham's and many other articles on the same subject. I made the statement that coccidia in the blood had been demonstrated by several investigators, notably by Pianese (Transaction Pathological Society London Vol. 21, 1890 p. 320) in the veins of infected rabbits. Reference to this is found in "Die thierischen Parasiten des Menschen" by Max Braun, 4th Ed. 1908 p. 107. A few years ago Clemns Heindl wrote a Doctor Thesis at the University in Berne in which he described coccidia in the small blood vessels of the liver. I have sent for this publication but have not yet received it. Probably the first investigator who referred to or demonstrated coccidia in the blood was Balbiana (Lecons sur les sporozoaires, Paris 1884) and since then different statements that coccidia in one form or the other were found in the blood have been made and accepted. Doeflein states that Isospora Lieberkuehni is carried in the bloodstream, and I know that Dr. Meyer will accept Loeflain as an authority on Protozoology. I also give as reference in the appended list, an instance where coccidia have been found in the lung, in the diaphragm, the liver and throughout both body-cavities. They could not possibly be disseminated in such a manner unless carried by the bloodstream (La coccidiose du dindon, No. 17).

The doctor says that these protozoa are obligatory parasites. Different publications do not tell us that. If you read carefully the German and other articles, you will find several observers that hold a different view. I can mention Eckhard (1903). It has been mentioned by others that they multiplied in mucous and intestinal casts as well as in all kinds of albuminous material when moist and warm. Guillebeau and Hess have demonstrated this, and I have followed their methods. I have large intestinal casts that are teem-

ing with coccidia. They are free from cellular structures. It is therefore not absolutely necessary that the parasite must be in a cell to pass thro: ;h at least a part of the agamonous life-cycle. We know very little about these protozoa, and their methods of multiplication in nature.

Many other phases of this subject would be of interest. I must suggest however that before any of us can make useful observations, we must read published articles and be sure we are not making mistakes. Look up these authorities and see whether we are right or wrong. If I, an individual, am wrong, there is not much harm done. It is beyond one man's effort to solve these important questions; many observers say that symptoms are alike, lesions are alike, and that therefore it is most difficult to say, this is rinderpest and this is coccidiosis. When we can take carefully selected blood, obtaining it from a laboratory where the disease has been studied for years, inject it into an animal in minute quantities, observe the animal as carefully as possible and report a severe attack of coccidiosis as the result of the inoculation, the subject becomes so important that it must be investigated. On the other hand, I must admit the possibility that the rinderpest-infection was present in latent form and that during any febrile reaction the epithelium became a favorable breeding-ground for the protozoan so that it could develop very rapidly, causing an acute attack of the disease. It is possible that this may occur; it is a matter of opinion only, however. Guillebeau (1893) demonstrated that a rapid division of coccidia occurs at a temperature of 30 degrees centigrade which differs from the usual forms as they occur at temperatures of 20 to 30 degrees centigrade. I have carefully considered this fact and have read Zublein's article (1908) having copies of it in my collection. After all, I thought it worth while to present this paper to you. I hope that some one who is in a position to do it will find out whether I am right or wrong. It is of the utmost importance that these questions be investigated, and my work checked up.

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THE ELECTROCUTION OF ANIMALS*

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In presenting this paper, the Electrocution of Animals, I encroach on a subject where the records are few, and the histological changes recorded only general, but I am calling your attention to a practical rather than an economic phase for the practitioner to consider.

*Presented at the meeting of the A. V. M. A. Section on Medicine, Oakland, Cal., September, 1915.

The lesions described are the same, independent of the portal, but the tissues involved vary with the point of contact, and exit of the current, with the exception of the blood and macroscopic appearance of the brain.

The amperes that entered the bodies and the voltage of the line that caused the death of the two horses from which the following post mortem records were made, was not determined: December 22, 1907, at about 8 P. M., found a gray mare dead in front of the car barn of the B. & N. S. R. R., on Merrimack Street, Lawrence, Mass.

The visible mucous membranes were cyanotic, no bloating, the urine had passed from her, she lay on the right side, head toward the right. The autopsy made, the twenty-third, in the morning, showed as follows: Bloated, cyanosis of visible mucous membranes, also the perineum, pupils dilated. Radial veins of the right hind leg were filled with dark blood, also the larger ones. Those of the left leg not so pronounced. The blood flows freely when the veins are cut. On the left side of the neck under the skin the radial veins are very much in evidence and bleed profusely, while in the right side under the skin they show in spots; the mucous membrane of trachea ecchymotic in the thoracic portion; ecchymotic along the union of the large colon; kidneys, spleen, liver and lungs show ecchymotic spots. There is an old circumscribed pleuritic spot over right lung. Radials seen in pericardium, small amount amber colored fluid in pericardium. The left heart very little fluid blood, and a serous clot of small size; right side of heart, empty. Post-mortem rupture of the diaphragm. Brain shows all the superficial blood vessels filled, a clot under cerebellum, both choroid plexii hyperaemic, substance of the brain ecchymotic.

Post mortem of the black gelding owned by A. St. Louis, of Lawrence, Mass., November 25, 1911: bloated, ulcer left foreleg under the fetlock, bar shoe on the right forefoot, aged, pupils dilated, mucous membrane of the buccal cavity cyanotic, body on right side.

When removing the hide from the left foreleg and left side of neck, the blood flowed freely and did not clot. Radials in this region filled with blood; radials filled in right hip with ecchymotic spots, cyanotic. Right side of neck under the skin hyperaemic, and petechial spots extending over the scapular region.

The muscular tissue on the left side of neck hyperaemic, blood fluid, dark, and flowed freely when the tissues were cut, same condition was seen on right side of neck, but not so gross. When the left foreleg was removed from the body the blood flowed freely, when the right foreleg was removed, not so much blood seen. When the abdominal cavity was opened, a small quantity of serous fluid escaped. A small aneurism due to strongyles was found at celiac axis.

A part of the capsule of right lobe of liver on its visceral side was thickened. Anterior lobe left lung cyanotic, with petechial spots and blood fluid. Petechial spots on left heart, small clot in left heart partly amber color, while the right heart was empty. Mucous membrane of trachea, mouth and tongue were cyanotic. Blood vessels in the convolutions of the cerebrum and cerebellum were hyperaemic. The plexus at base of cerebellum hyperaemic.

In the following post mortem records, death was caused by 1/5 ampere and 1500 volts, applied for 30 seconds in the dog and 60 in the cat.

In the dog, the current entered the body through a brass collar, with sharp points on the inside, the dog being suspended with only the hind feet resting on the wet metal floor. When taken from the chamber the respirations had stopped but there was a distinct pulsation for some time, but the time not recorded. Rigor mortis absent, pupils dilated, buccal cavity cyanotic, hyperaemia of digestive tract, heart empty, hyperaemia of the brain, the choroid plexii, and base of cerebellum; blood fluid and dark. The blood exposed to air and sunlight in a shallow dish for about one hour, became congealed like jelly, without any serum, but there was a very thin layer on the exposed surface that was scarlet in color.

A cat placed in a closed metal chamber was killed with same measured current, continued for sixty seconds. Post mortem records showed rigor mortis absent, hyperaemia of lungs and digestive tract, petechiae in lungs, heart empty, blood fluid and dark and flowed freely where the vessels were cut.

The hemorrhage following the contact with electric current is difficult to control, in man, and death only occurs when the voltage can force sufficient current the required time, and that will vary with the resistance of the body.

This is well illustrated from the fact that the measured current referred to required from 2 to 3 minutes to kill a kitten and 15 to 90 seconds for a horse.

It is recorded by the Edison Illuminating Co., of Boston, Mass., that the amperage was sufficient on a line carrying 113 volts to accidentally kill a horse.

"Powerful electrical discharges upon the animal's body induce paralysis of the nervous apparatus (especially of the respiratory centre), electrolytic destruction of the red blood cells, local burns of the skin and laceration of the tissues. Death usually follows, but the paralysis and unconsciousness may, after shorter or longer duration, go on to recovery.

"According to Leblanc, horses are exceptionally susceptible to electricity. A horse was killed, for example, by a relatively light current which the owner passed through the bit in order to divert the attention of the animal while being shod." (Kitt)

"The electric current destroys the coagulability of the blood."

"Blood will not clot when death is caused by electric current." Dr. Edward Anthony Spitzka, of New York, says, "The blood is profusely altered biochemically. It is of a dark brownish hue, and it rarely coagulates. Either the fibrinogen or the fibrin element or both are destroyed."

"The anatomical changes, in so far as the internal organs are concerned, in death from this cause may be very slight. Essentially they are such as are characteristic of death from asphyxia." (National Electric Light Association Bulletin, Nov. 1914).

As I said at the beginning, this is not an economic question, but practical for the practitioner, illustrated by the fact that in the case of the horse owned by A. St. Louis, Bay State Street Electric Co. was called upon to pay for said animal. The police and superior courts found for the defendant, but the supreme court reversed the findings in sum agreed upon by the superior court when taken from the jury, if the supreme court found for plaintiff.

Some of the testimony of the expert veterinarians employed by the defendant is very interesting.

Question: "Now, doctor, assuming that the horse was electrocuted, wouldn't there be trouble in the brain?

Answer: No, sir.

Another interesting answer was that the clot in celiac axis could break up and a clot lodge at the center of respiration and produce suffocation. Without external burns any lesions found in body would not indicate death due to electricity.

In the supreme court of Massachusetts, in the case of St. Louis vs. Bay State Railway Co., under date of December 15, 1913, Chief Justice Rugg handed down the following as a part of the findings of said court:

"As the plaintiff on a wet November afternoon was driving at a moderate speed, his horse stepped on a rail of one of the defendant's tracks in a public way; a spark came from the rail, the horse stopped suddenly, went backward a little and then fell and died. A veterinary surgeon of long and wide experience expressed the opinion, based on the appearance of the organs revealed at an autopsy, which he described in detail and which in some respects was peculiar to electrical action, that the horse was killed by electricity.

There was testimony that the rails and other apparatus and appliances at the place of the accident were in perfect condition on the following morning, but that still it was possible for the horse to be killed by reason of a short circuit between a rail and wire at some point on the track further from the power house than the place of the accident, and that on a wet day there was more danger from wires or rails through which an electric current was passing than on a dry day.

In accordance with the terms of the report, let the entry be judgment for the plaintiff for $140."

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THE SIGNIFICANCE OF THE FEVER COMPLEX IN THE COW*

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If one object more than another has exercised a controlling influence over my thoughts and motives in the preparation of this paper, it has been to stimulate if possible, a new demand for a progressive and definite understanding of a few of the obscure pathological conditions in the cow.

The dearth of literature on diseases of cattle and their treatment is due to insufficient knowledge of the actual process occuring in the body. Such actual knowledge can only be gained by observations in the field.

*Read before the Ohio State Veterinary Medical Association in Columbus, Ohio, January 13, 1916.

I therefore felt after a few years of practice and thoughtful study that something along this line would be acceptable, no matter how unscientific or reasonably true it may be. But there are not a few processes occuring in the animal body which are so hidden as not to be at all evident to a superficial examination, and yet, they are of the highest importance. It is for this reason, that I propose to call attention, to some consideration of the phenomena of fever in the cow.

Heat of the body, is one of the all important conditions of its mechanism. Physics teaches us that whatever energy is expelled on a machine or device of any kind, an exactly equal amount of energy always appears as useful work or as heat. Wasted work always appears in the form of increased molecular motion, viz. in the form of heat. Thus energy may be transformed but it can never be created or destroyed.

The advance of the physical and physiological doctrine have given us definite ideas as to the relation of animal heat to the metabolic processes of the animal body.

Heat production in the body is the result of vital work. Every organ and cell is engaged in the work of generating heat, which is a process of oxidation going on in a gradual or modified way. The end products of which are carbon dioxide, eliminated from the lungs, and water and urea through the kidneys. The tendency therefore of the chemical changes in the tissues are such as will set free energy in the form of heat. The higher the degree of activity, the greater the rate of heat production. Hence, those organs that are most active in the performance of their duties, the greater amount of heat they will produce.

It is a fact that heat is liberated in the body:

1st. From the food, viz. from the recombination of dissociated food-stuff.

2. From tissue katabolism viz. from the oxygenation of tissue products. Work performed by the cells leads to dissociation in the cell substance, and it is the union of these products of dissociation with oxygen that produce the heat. If therefore, in the febrile condition there be increased production of heat, despite lessened intake of food, and despite a loss of heat which is not less than normal, that increase of temperature can only be due to tissue disintegration and oxidation, or of increased heat production due to nervous influences, it is not the nerve centers themselves

that produce the heat but rather the dissociative changes in the respective cells set up by nervous stimulation that is the cause.

There are numerous conditions that profoundly affect the process of heat production and one which I believe of great importance in the cow is glandular activity, the mammary gland is the source of an enormous amount of heat and I believe has a marked effect on the complex febrile condition in the cow. Likewise the liver, the largest gland-like structure in the body, more richly supplied with capillary blood than any structure in the body. Blood in the hepatic vein during digestion may have a temperature, 3° or 4° higher than that of the portal vein. Other conditions influencing heat production are, muscular activity and digestive activity. Heat production is increased 35% to 40% during digestion. The influence of the external temperature upon heat production is a matter of great practical importance.

Cold applications to the external surface of the body increases heat production, short applications of the heat, lessen the heat production, and at the same time, increases heat elimination, thereby causing a decline of body temperature. A continuous fall in the external temperature can not be withstood. When a point is reached at which the rate of heat production is below that of heat loss, the animl dies of cold. Likewise a continuous rise of external temperature can not be borne as a point is reached when heat discharge ceases. Heat becomes stored up in the body and heat stroke follows. A higher temperature can be withstood in a dry atmosphere as evaporation from expired air and surface of the body does not easily occur in a moist atmosphere.

The processes of heat elimination from the body are due to

1st. Surface radiation and conduction provided the external medium has a lower temperature than that of the body. If hotter, the animal body gains heat.

The loss of heat in the cow through radiation and conduction is comparatively small for the reason that the dry hair of the cow is a poor conductor of heat. When moistened through exposure to rain, or perspiration, its conductive power increases in a marked degree. Heat loss by radiation and conduction is lessened by artificial covering which by imprisoning the warm air interposes a poor conductor.

2. A more important means of heat elimination is found in the evaporation from the mouth and nostrils. The importance of this factor is constantly seen in the so-called "bedewed muzzle" of the

cow in health. From these facts it becomes evident that the need of greater heat elimination is compensated for by the panting respiration.

3. Heat loss through the excreta is another means by which temperature is lowered.

The discharge of heat from the body may be increased, 1.By dilation of the surface vessels. 2. By increased pouring out of sweat. 3. By increased respiration.

Both the production and elimination of heat due to the above mentioned causes are subject to constant and marked variations.

The indications of increased heat production are a moist warm skin or hot dry skin. While those of decreased heat elimination are a cold dry or moist skin, goose flesh appears and shivering. An excessive increase of heat production and without proportionate elimination is present in vital fevers and inflammations.

In order to maintain the temperature at a constant point, heat production and elimination must balance. Otherwise the heat resulting from metabolic activity would continue to rise until the destruction of the animal. Although it has never been proven, there surely must be situated somewhere within the brain or spinal cord, nerve centers, which regulate the production and discharge of body heat. That the new born calf or colt passes as it does from an intrauterine temperature of 101°–103° to that of zero or thereabouts in the stable in safety if not comfort, would seem to indicate this fact. In fever, this heat regulating mechanism is markedly disturbed. And the facts are adequate to show that the disturbance is in the direction of increased heat production rather than lessened discharge.

The reduction of temperature therefore, in fever, is accomplished either by diminishing heat production or increasing heat elimination or both.

The physiological means by which fever is controlled are by decreased activity, loss of appetite, and thirst. The therapeutic measures adopted to influence heat production and heat elimination are by various antipyretic drugs, but the effects thus produced are purely toxic in character and involve not only the heat producing and regulating centers but other important centers as well, thereby lessening the natural resistance of the body and the activity of the processes of repair.

I therefore believe that the use of antipyretic drugs in fever is

irrational and unphysiological, and when more rational means of combating fever of all types are more thoroughly understood, and more generally used, the mortality from this cause will be reduced.

As inflammation is a reaction on the part of the injured tissue to repair, so have I defined fever, as a reaction on the part of the organism toward recovery. Or, the process of adaptation of the tissues to such toxic substances as can be neutralized by the development of antibodies. So that fever in the course of an infection may be regarded as an indication that the production of antibodies is progressing favorably. While on the contrary, the absence of fever in cases of severe infection may be an indication that the cells are so overwhelmed by the toxins that they can not react in the usual way.

In dealing with fever, it is important to determine the cause which may be simple exposure to heat, violent exercise, exhaustion, a cold with retained excretions, toxemia from decomposing food, or decomposition of food by long retention in the alimentary canal, uric acid, toxins produced in infectious diseases, local inflammations, gastritis, peritonitis, infected surgical wounds, nervous influences microorganism-termed infection is the most important.

It will be perhaps more serviceable to consider the most common general process and in so doing, that systemic reaction to microorganism-termed infection is the most important.

The presence in the body of some active infective material, although its cause and nature vary somewhat in different infections as a rule causes fever, due probably to the absorption of chemical bacterial products. Once bacteria enter the tissue and begin to grow, from that moment on we have the beginning of the infective process, although we are not able to recognize it. If the entrance of the germs be local, there is first a period of local growth, with the absence of any general disturbance or observable symptoms. This process is regarded as a period of incubation. But from the onset of the actual disease, we have the supervention of fever that affords us a useful starting point for the establishment of a diagnosis. But quite frequently the absence or presence of fever in a given case in a cow is extremely misleading.

Infection by microorganisms may be local or general thus in the case of pneumonia while the presence and activity of the pneumococcus is at first confined to the lung it extends generally throughout the system.

In like manner the streptococcus infection may be either local or diffuse. In the latter case resulting in extensive septicemia. In both cases the symptoms are brought about by the one common cause. viz. the diffusible toxins. It is the nature and toxicity of these products that are most important in the development of infections. They are the characteristic disturbers of metabolism.

An infectious disease affects metabolism: 1st. by changing either chemically or in amount the substances entering the body. 2. By altering in the same way substances leaving the body.

3. By setting up new chemical processes in the tissues themselves, the amount of substances entering the body through the intestinal tract reduced in infectious diseases in many ways: as by anorexia, by pain from laryngitis or pharyngitis, muscular inability, as in tetanus. The available material may be further lessened by diarrhea, lessened power of the digestive juices, or interference with the intestinal absorption. Regardless of the diminution of the substances taken into the body, the life processes must be maintained and are so done at the expense of the materials stored in the body. And of these, the carbohydrates and fats are the first to be consumed, followed later by the proteid. Such chemical changes alter the substances leaving the body especially the expired air and urine. Infectious diseases further affect the substances entering the body through the respiratory tract. Oxygen, in amount, entering the tissues may be reduced by narrowing the respiratory passages as in edema. The presence of exudate around the alveolar walls, or by a reduction in the oxygen carrying power of the circulating fluids.

Abnormal chemical changes occur in the ingested material from the action of putrefactive bacteria or by excessive action of yeast or through the action of the specific microorganism as well. Lowered acidity of the gastric juice and lessened peristalsis so characteristic of many infections, favor bacterial growth.

Interference with the output from the body may bring about abnormal retention of the products usually excreted. Such as in pneumonia in which there is a formation of a large amount of exudate. On the other hand, there may be abnormal losses as in inflammatory diseases of the kidneys in which the toxins affect the renal epithelium, causing a loss of albumen, globulin and other blood constituents. Probably all of the tissues of the body are profoundly affected in their metabolic activity, either through the direct ac-

tion of the toxic substances or waste products, or indirectly through the nervous respiratory or circulatory changes.

Alterations in the chemical processes within the body due to increased katabolism as shown not only in the increased heat production but in the excretion of an increased amount of the end products of metabolism. Infection may cause death and disintegration of certain cells of the body and a decomposition of body fluids as shown by the breaking down of the erythrocytes in anthrax by parenchymatous degeneration and by circumscribed necrosis in abscesses. The effect thus produced depends largely on whether such tissues are subjected to the action of the bacteria or their toxins or both. In the last case the putrefactive process is rapid and intense. In most cases of acute infectious diseases, the toxic substances pass in the general circulation producing constitutional symptoms best described as toxemia. However, a bacterial intoxication without infection may be observed in various forms of food poisoning, introduced in more or less amount into the gastro-intestinal tract. The symptoms thus produced depend upon the rapidity and amount of absorption. Such cases are common in the bovine species with apparently rapid absorption. The temperature rises to 106°–108°. In these cases elimination through the intestinal canal by magnesium sulphate generally affords relief.

It is essential therefore in considering bacterial intoxication to distinguish between those following infection preceded by a period of incubation and those due to absorption of toxins without infection.

Among the earliest associated phenomena of fever, are chills. Though the surface of the body may feel cold, the thermometer in the rectum will show an elevation of temperature due to retention of the blood in the splanchnic area and consequent local anemia of the surface vessels. This vascular change naturally involves heat storage within the organism.

Often associated with chills are fine fibrillary contractions of the individual muscles of the face, trunk, or extremities, corresponding to an increased stiffening of the muscles resembling rigors. By this mechanism heat production is reflexly increased. This increased contraction clearly plays a part in the earlier stages of the febrile state. While later it gives away to relaxation and exhaustion and the muscles of the body seem to diminish in size more quickly than can apparently be explained by the combined lack of

exercise anl lessened assimilation. This rapid burning up of the muscles as it were, is another indication of increased heat production.

In certain stages of acute infections, we find the pulse full and bounding and in others weak and easily compressible. In all cases the heart-beat is decidedly increased in rate. In a prognostic sense strengthening of the pulse and lowering of the rate is a favorable sign. Whenever the bed of the blood stream is widened in any considerable area without corresponding contraction of the bed at other points, where there is lessened resistance to the flow of blood, pressure sinks, and the heart-beat increased in rate. The general lack of body tone and muscular vigor during the course of a high fever indicate that such a factor is at work.

The increased rate of respiration is a cardinal symptom in the course of an infection. Such increased rate is common to all conditions in which either the body is exposed to increased external temperature or the body temperature itself is raised. This is one of the means of discharging and reducing the heat of the body. Whether this is the primary result or not, anything which increases the temperature of the blood bathing the respiratory center, leads to an increased rate of respiration, whether it is beneficial to the organism or not. The accumulation of carbonic acid in the blood affects the respiratory center as well. Increased temperature favors increased metabolism in the individual tissues, and heightened metabolism means increased using up of oxygen, resulting in excessive elimination of carbonic acid and the higher the temperature, the greater the absorption of the one and discharge of the other. Thus we have the primary cause of increased respiration and also a striking demonstration of what must be regarded as the prominent underlying feature of fever, viz. greatly increased metabolism, that metabolism leading to increased temperature, to increased discharge of carbon dioxide in the blood, and to the increased rate of respiration.

The amount of urine passed is diminished during fever and what is passed is concentrated and high colored, due to lowered blood pressure and increased discharge of water by the lungs, skin and in some cases the feces.

Anorexia is characteristic of all fevers. The mucous glands of the stomach and intestines are busy excreting toxins from the system. Therefore they can not be equally active in their absorptive

duties. Or the cells of the tissues in general devote their energies to the elaboration of an antitoxin instead of the commonplace assimilation of foodstuff.

Emaciation is also common in long continued fevers. Despite the lessened intake of food, there is a reduction of the fatty tissues. Fat is capable of giving off more calories than any constituent of the body.

There is in fever, to repeat, no mere retention of heat but a most evident increased production.

Now, it is noteworthy that in all of these, the reaction results in the production of antibodies, of substances which neutralize the toxic substances. In recognition of this fact, we coincidentally gain insight in to the essential nature of fever. In view of the foregoing, in cases of severe infections instead of a rise of temperature, there is a progressive fall, or occasionally a transient rise followed by a rapid fall, which continues until a point far below normal is reached, and death ensues. The tissues in short are poisoned and there is no adequate general reaction. There are cases on the contrary in which death occurs in hyperpyrexia due, however, to the selective action of the toxins, as in tetanus in which the selective action is on the nervous system. But the general reaction is proceeding vigorously.

After all, is an increase in temperature in itself a serious part of the pathological process, a symptom to be fought and if possible removed from the body, or is a rise of temperature in a nature of protective mechanism? That fever is indeed a consuming fire, but a fire that wastes the body to destroy the bacteria?

At this point, I am conscious of having exceeded the limits of my time and possibly your patience. Diseases of the cow (now that nearly everybody owns or intends to own an automobile) are daily coming into greater prominence. Our responsibility is shifting somewhat and it behooves us, it seems to me, in recognition of this fact, to do more than we have heretofore done in the pathology and treatment of her diseases. There still remains, in spite of our knowledge, considerable obscurity in our bovine pathology. What, for instance, is the cause of milk fever? Is the paresis a chemical or vascular phenomenon? Can any one explain why inflation of the udder meets with such marked success? What is Dr. Steffen's so-called persistent anorexia, an afebrile condition, so often met in our daily practice with cattle? Or likewise paraplegia, or his so-called

bovine azoturia, usually an afebrile reaction? Has any one ever made an examination of the intraspinal fluid in such cases? I could continue as we all could, indefinitely, in this direction, but decency forbids. Let me conclude by thanking you for your patient attention and with the hope that my subject may call forth a discussion calculated to illuminate the points which I have briefly enumerated.

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DISEASES AND TREATMENT IN IOWA*

Hemorrhagic septicemia has been reported from practically all parts of the state. It is probably being more generally recognized and also is increasing in prevalence. The *B. bipolaris septicus* is apparently of much more significance than was supposed as it seems capable of producing disease in most of our domesticated animals including fowls. The tendency for the disease to occur without any apparent introduction of the infection from diseased animals and the fact that some of our best pure bred herds have suffered heavy losses makes it especially important that steps be taken leading to an early recognition of the disease and the adoption of such preventive measures as are possible under existing conditions.

Among cattle the disease is frequently acute and accompanied by nervous symptoms such as intense pruritis which may be severe enough to lead to laceration of the skin on sharp objects in attempting to relieve the disagreeable sensation. Other nervous symptoms are apparent blindness and clonic spasms especially of the head and neck. Such cases usually die in sixteen to twenty-four hours and the mortality is very high, especially among young calves.

Prevention and treatment consist of removal of the healthy animals from the diseased ones and providing a change in source of food supply and uncontaminated drinking water. As infection is eliminated with the feces, steps should be taken to properly dispose of feces from infected animals.

Serum from horses and cattle immunized by injections of increasing doses of pure cultures of the *B. bipolaris septicus* is prov-

*Report of the committee on Diseases and Treatment, presented at the meeting of the Iowa Veterinary Association, Des Moines, Ia., January 16. C. H. Stange, Chairman; F. R. Ahlers, L. U. Shipley, A. L. Wood, John Patterson.

ing to be of value in treating sub-acute cases as well as conveying a passive immunity. While the work along this line is still largely in the experimental stage, the work of the research department of the veterinary division points at present to the indication for the use of serum on those animals already infected and vaccination or sero-vaccination of those not infected.

TUBERCULOSIS. This insidious disease is taking increasing toll from our live stock industry. The following significant table was prepared by Dr. W. E. Simonsen, with figures received from the Bureau of Animal Industry, gives the number of affected animals in federal inspected abattoirs:

	UNITED STATES		IOWA	
	Cattle	Hogs	Cattle	Hogs
Year	Per cent	Per cent	Per cent	Per cent
1907	.31	1.3	4.52	1.69
1908	.72	1.2	1.26	2.61
1909	.85	1.5	1.64	3.22
1910	.95	2.6	2.02	3.67
1911	.90	2.8	2.71	4.86
1912	1.14	1.01	2.81	6.54
1913	1.11	1.25	3.02	7.37
1914	1.10	1.36	3.66	9.37

Attention is called to the fact that in 1914 the percentage of tubercular hogs was five and one-half times as great as seven years previous. This not only presents a situation concerning our swine industry which requires attention but it is also a highly significant indication as regards our cattle. Iowa slaughtered hogs were 6.8 times as tubercular as the average hogs of the United States slaughtered during the same year and under the same system of inspection. Cattle were 3.3 times as tubercular as the average for the United States.

If, as statistics indicate, 9.37 percent of Iowa's hogs have tuberculosis, a large percentage of which probably become infected from cattle, we are having greater involvement of our animal industry and hogs especially with tuberculosis than hog cholera, as the percentage of losses from hog cholera are less at present than the reported cases of tuberculosis.

In the suppression of tuberculosis it is doubtful if any plan will be successful which provides for the destruction of all animals reacting to the tuberculin test. Especially is this true if just compensation is not provided for. Privilege of slaughter under in-

spection while valuable where nothing better is available does not take the place of reimbursement. The Bang method which has been quite successful in Europe, is, however, not well adapted to our agricultural conditions. Two other plans which give promise under circumstances such as surround the campaign against tuberculosis in the central west are:

1. Plan of Ujhelyi of Hungary which permits the calves of reactors to nurse healthy cows or if necessary their dams. At weaning time all calves are carefully tested and the non-reactors are placed in the healthy herd. This plan has been very successful in eight Domaines in Hungary and the quarantine herd at the Iowa Experiment Station was handled according to this scheme. Of the 16 calves dropped by the cows in quarantine only 3 reacted.

2. Ostertag's Method: This provides for a careful bacteriological examination of the milk and other secretions twice each year. The animals with open lesions (spreaders) are removed and the calves are fed on either pasteurized or healthy milk. The calves are tested as under the preceding plan. This plan is being more generally adopted in Prussia and is leading to a gradual decrease in the disease. Eradication by this method, however, could hardly be expected.

Apparently the most urgent need for comprehensive work at the present time is along the lines of tuberculosis suppression.

HOG CHOLERA: The crest of the last hog cholera wave was reached in 1913 when the losses in Iowa amounted to about 28 millions of dollars. The disease reached its maximum in about 2 years and we enter the year 1916 with less hog cholera probably than any time during the last 5 years.

The tendency on the part of many to discontinue immunization as soon as the immediate danger is over is well shown by the great decrease in the application of serum as soon as the disease had receded. The great need now is an organization which will immediately urge the immunization of exposed herds and the cleaning up of infected premises. No organization is available in the state which can successfully combat this disease which does not contain a large percentage of the owners of herds, also the practicing veterinarians. Eradication which would be the ideal is entirely out of reach of our present organization and facilities. We must put every available factor to use in an effort to prevent another extensive, statewide outbreak.

As regards the results from the use of serum the following figures indicate what may be expected under the average Iowa conditions:

SICK HERDS

	No. treated	% sick	% died
Serum alone	19,613	42.7	29.1
Serum simultaneous	61,164	16.1	11.2

HEALTHY HERDS

	No. treated	% died
Serum alone	7,975	1.8
Serum simultaneous	134,735	2.2

Summarizing all the reports we have 223,487 animals of which 08.15% were reported sick when treated and 07.10% died after treatment. It must be concluded therefore that hog cholera serum is the only efficient agent known at present that can and will be used voluntarily by the swine producers as a preventive against hog cholera and therefore must be principally relied upon in attempts to control the disease in the future.

While there are some who attempt to have it appear that hog cholera has simply been following its natural tendency, uninfluenced by the efforts of the supporters of the use of serum, it is nevertheless significant that during 1913 the disease spread rapidly, quite largely due to a shortage of serum which, under such conditions, is usually applied in sick herds, while in 1914 there was ample serum and 59,852,175 c.c. were used in Iowa alone and the losses were reduced about two-thirds. During 1915 about 29,529,054 c.c. of serum were used in this state and the disease has been steadily declining.

FOOT-AND-MOUTH DISEASE: The chief of the Bureau reports that "the source of the outbreak, which started near Niles, Michigan, has never been definitely determined, and actual proof will probably never be obtained, although the infection was undoubtedly introduced in some way from abroad."

Your committee does not feel that it is necessary to enter into details in regard to the eradication work. The extent of the outbreak may be judged, however, by the fact that up to June 30, 1915, animals appraised to the value of $5,243,138.55 had been slaughtered. Cost of disposing of the carcasses was $156,049.22 and during the process of disinfection, property to the value of $22,158.51 was destroyed. In addition to the above the disease reappeared in Aug-

ust due to infected hog cholera serum. As a result of this last outbreak it was necessary to destroy about 400 additional herds, mostly in Illinois. On the whole 23 states were involved. At present two counties in Illinois represent the sum total of the quarantined area.

INFECTIOUS ABORTION: The significance of this disease in the minds of breeders of fine stock may be appreciated from the remark of a prominent dairyman that "the control of contagious abortion would mean more to us than the control of tuberculosis."

Infectious abortion of cattle is becoming more prevalent and not seldom valuable breeding lines are discontinued and the animals sent to slaughter on account of being infected. The name of the disease does not represent all the possibilities and results in infected pregnant animals. In addition to abortion we have premature births and retention of the foetal membranes in many animals. Further complications may be white scours among the calves that are not lost at birth, and sterility of the dams.

The abortion bacillus may be spread to other animals by the exudate which is given off by aborting cows before as well as after parturition. The opinion that infection took place per vaginam by infected straw and discharges, which has been quite generally accepted heretofore is now doubted by M'Fadyean and Stockman as well as by Zwick and Zeller. The former investigators demonstrated that infection is more certain by ingestion than by introducing the organisms into the vagina. Infection through the digestive tract therefore should be given the first consideration.

The bull may spread the disease in a mechanical way by copulation. He may harbor abortion bacilli for a long period of time without showing symptoms of disease and still transmit the disease on copulation.

The significance of milk in the spread of the disease requires further investigation. One of the questions is whether calves become thus infected and later become aborters or whether they develop an immunity.

A most important consideration in this disease is an early unmistaken diagnosis. Clinical symptoms are not dependable. In demonstrating the abortion bacillus we are confronted with the fact that it has no sufficiently specific characteristics as regards morphology and staining and the making of cultures is not practical. M'Fadyean and Stockman attempted a rapid and certain diagnosis

with an agent prepared after methods used in producing tuberculin and mallein. This so-called "Abortin" was said to give a temperature reaction in 4 to 14 hours following a hypodermic injection of one-half to one cubic centimeter. Further investigations demonstrated its unreliability. The ophthalmo reaction was tested with like results. Diagnosis of infectious abortion with abortin therefore leaves much to be desired.

Authorities are well agreed on the value of the agglutination and complement fixation tests in diagnosing this disease. Accoring to Grimstedt, M'Fadyean, Stockman, Wall, Holth, Zwick and Zeller, Belfants, Stazzi, Reisinger, Muller, Hardenberg, Schumann and others an existing or previous infection with abortion bacillus may be determined by means of the agglutination and complement fixation methods. Even these tests, however, indicate simply that the serum came from an animal in an infected herd and that it is or was infected. They do not reveal anything concerning an existing pregnancy or whether the animal will abort. The precipitation method does not give uniform results.

Recent experiments indicate that while abortion and contagious vaginitis frequently co-exist in herds the identity of their etiology cannot be accepted.

The control of infectious abortion in the light of our present knowledge must be along the lines of preventing its introduction into and spread among a herd. Isolation and disinfection are therefore the chief measures to be relied upon. Serological examinations should be made of all animals intended for introduction into healthy herds. A difference of opinion exists as regards compulsory notification of the presence of the disease. Control is further embarrassed by the question as to when an animal may be considered as recovered. Education would seem preferable to sanitary police measures.

Immunization seemed hopeful from the fact that animals that had aborted from one to several times afterward retained the foetus in a normal manner.

Passive immunization on account of its short duration and great expense was not found practical and therefore active immunization was attempted by various methods. Bang of Denmark, M'Fadyean and Stockman of England conducted valuable experiments along this line. The Imperial Board of Health of Germany conducted experiments with 4,599 animals of which 2,442 received different kinds of vaccine.

These experiments were conducted under practical conditions, the animals being kept under ordinary farm conditions. No decisive results followed the use of immunization agents such as serum, living cultures, or killed cultures. This much may be said, however, that a readily apparent decrease in the number of abortions did not take place, as on the average 15.83% of the treated animals aborted, while 18.13% of the control animals aborted. The use of living cultures give greatest promise as only 8.01% aborted following their use. Sir Stewart Stockman reports even more encouraging results from living cultures, the percentage of abortions following vaccination being 6.5 as compared with 38 in control animals.

FORAGE POISONING: Information regarding the condition commonly called forage poisoning or cerebro-spinal meningitis is very unsatisfactory. Experiments carried out by the Bureau of Animal Industry were indefinite. The feed was reported as mouldy but feeding it to experimental animals did not reproduce the disease. Blood inoculations were also negative. Some cases investigated by our research department revealed the presence of an organism probably belonging to the bipolar group, which was difficult to isolate and which was found to be pathogenic on inoculation. That mouldy silage and to a certain extent other foods are fatal to horses there can be no question but the exact nature of the disease producing agent contained in such foods has not been established. Some cases occurring on pasture and occasionally also in stables where no definitely spoiled condition of the food can be established point toward a variety of causes of similar symptoms or one cause existing in a variety of food-stuffs. No more than the average number of cases have been reported during the past year.

ANIMAL PARASITES:—The large number of inquiries received by the veterinary division indicate the increasing prevalence of parasites among our domesticated animals and also that either many stockmen do not consult their veterinarian in regard to parasites or the average veterinarian does not pay sufficient attention to this branch of his practice. In this report we wish to call attention especially to the increasing prevalence of sclerostomiasis among horses and the favorable results obtained from the use of atoxyl which was first used at the Iowa State College after noting the beneficial results obtained by Bockberg and Dorn.

Generally speaking no agent is absolutely specific for certain species of nematode worms. A generous diet is one of the most essential parts of the treatment. Periodic doses of anthelmintic medicine should be given at intervals where animals are known to be exposed. This is more successful in serious outbreaks due to strongylidae than the curative treatment.

The injection intravenously of sterile solutions of atoxyl in 4 to 12 grain doses followed by tartar emetic per orem in most cases leads to marked improvement and at present seems the most successful treatment we have.

SUMMARY.

Hemorrhagic septicemia is being more frequently reported. Prevention is along lines of isolation, disinfection and immunization.

Tuberculosis is spreading quite rapidly especially among hogs and deserves federal and state attention.

Hog cholera has decreased rapidly in the last two years but an organization should be perfected to prevent extensive outbreaks in the future.

Foot-and-mouth disease has been practically eradicated at a cost exceeding six millions of dollars which, however, is small when we consider that one infectious disease among hogs produced twenty-eight millions of dollars in losses in Iowa alone.

Infectious abortion is next to tuberculosis producing the greatest losses to the live stock industry. Prevention is along sanitary lines but the use of living cultures for vaccination purposes is giving encouraging results.

Forage poisoning continues about the same as regards frequency. Little definite information is available regarding the specific cause, consequently no new treatments can be suggested.

Animal parasites continue to produce heavy losses. Of chief significance is sclerostomiasis of horses for which atoxyl intravenously and tartar emetic per orem seem to be the most satisfactory treatment.

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NOTES ON A LITTLE-KNOWN RABBIT EAR MITE*

(*Psoroptes cuniculi* Mégnin)

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On April 8, 1915, a gray male rabbit, which was one of twenty-two being used for experimental purposes, was reported to Dr. F. H. Chittenden, in charge of truck crop and stored product insect investigations, as manifesting signs of sickness. Dr. Chittenden, after verifying the report and convincing himself that something was radically wrong with the rabbit, requested the writer to ascertain as far as possible the nature of the ailment. A superficial examination disclosed the following symptoms: loss of appetite with a subsequent loss in weight, mental stupidity, difficult breathing, lack of physical vitality with a partial paralysis of the fore-limbs and neck, lopping of ears and general lethargic condition. It is significant that this particular rabbit should have been the first to show signs of disease, as he was known to be extraordinarily active and the first to see and avoid danger as well as to attack an enemy. His exceptional speed and courage, had, indeed, made him the terror of all the remaining males, not only was this rabbit a monarch over all the others, but his pugnacious disposition led him to attack his attendant on several occasions inflicting slight wounds and tearing holes in the legs of his trousers. Physically, when in a normal condition, he was a splendid type of rabbit, possessing a large, broad head with large, clear eyes and thick, heavy-set ears, rounded shoulders, powerful legs, in fact, a generally symmetrical form, typifying strength, speed, and endurance.

Owing to these qualities the writer is of the opinion that no other rabbit in the lot could have survived this disease for the same period, but would have succumbed in a very short time.

The first examination led to a diagnosis of pneumonia. Castor-oil was administered through the oesophagus and a little Epsom salts kept in the drinking water. The rabbit was immediately segregated and given plenty of succulent green food. Three hours later his condition was noticeably worse. A rigid examination for further complications was made and the disease in question, somewhat commonly known as rabbit ear mange, was disclosed in the right ear.

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This disease is caused by a mite, determined by Mr. Banks as *Psoroptes cuniculi* Mégnin, and has not hitherto been formally recorded in America, although Mr. Banks has a note on its having been collected in the ears of rabbits by Mr. H. E. Ewing, February 4, 1907, at Urbana, Ill. A still later publication on the mites of Illinois by Mr. Ewing failed to mention the occurrence of this mite in Illinois. In fact, great difficulty was experienced in securing references, and with the exception of one* no economic record was found. In the publication quoted descriptions of all stages and the life history is given, thus obviating the necessity of further mention in the present article. It may be well, however, to mention that Mégnin calls this mite *Psoroptes du lapin, Psoroptes longirostris* var. *cuniculi,* but Mr. Banks regards *cuniculi* as a distinct species rather than a variety of *longirostris.*

The right ear was filled with waste organic matter which completely stopped up the external auditory meatus while the left ear was only slightly affected, with practically no waste material present. All stages of *Psoroptes cuniculi* were present in this waste material which seemed to emanate from the interior of the ear and slowly work outward. This copious supply of organic tissue waste undoubtedly favors the development and when once the mites gain a footing their progeny increases at a prodigious rate. The eggs are laid singly on the surface of waste material. After cleansing both ears, the writer bathed the skin thoroughly with 2% carbolic acid (phenol) and applied a thick coating of vaseline. On the following morning the rabbit appeared about the same, still refusing both food and water, not being tempted by the most succulent greens. His right ear contained more semi-opaque waxy material which was removed and again thoroughly washed with 2% carbolic acid and subsequently treated with mercurial ointment instead of vaseline. Attempts were made on three occasions to infect normal rabbits by introducing the fresh organic matter harboring numerous living mites into their ears. The infected matter was held in place by a wad of cotton forced as far as possible into the ear passage. All three attempts were unsuccessful, the rabbit removing the cotton in each instance with the aid of his front feet.

The following morning the sick rabbit continued to refuse food and showed no signs of recovery. The case was then referred

*Parasites et Maladies Parasitaires. P. Mégnin, 1880, pp. 191, 193.

for further investigation, to Dr. A. R. Ward of the Pathological Division, Bureau of Animal Industry, who assigned the case to Dr. J. S. Buckley. From a superficial examination, Dr. Buckley stated that he rather suspected paralysis of the digestive organs. As far as he could ascertain at that time breathing and heart action were about normal. Upon his suggestion the writer injected about 20 c.c. of diluted glycerine into the rectum to relieve constipation. Five minutes later the purgative was rejected without even a change in coloration and without the slightest odor. Following this, Dr. Buckley advised a small dose of nux vomica, to stimulate heart action and as a tonic. Almost immediately after receiving the dose the rabbit rallied somewhat, but only temporarily, for one hour later his spirits had sssumed their previous condition. From this time on the rabbit manifested acute attacks of paralysis in the neck and fore limbs, which convinced the writer that his condition was such as not to justify further treatment. The rabbit died during the night of April 11, 1915, and Dr. Buckley performed a necropsy the following Monday morning, April 12, which verified his former diagnosis.

All organs, from a superficial examination were apparently normal, except the bladder, which was greatly distended with urine. This latter trouble, according to Dr. Buckley is generally a symptom of a disturbed brain and is exceedingly common in rabies, in fact, it is a usual finding in fatal cases. His conclusion logically sums up the case as one where the brain had been materially disturbed with the natural sequence of paralysis of all closely associated organs. Dr. Buckley removed a small portion of the skull containing the base of the right ear and a portion of the brain intact (see Fig. 2). After careful examination under a microscope, the writer was able to find at least six living mites in a mass of foreign material at the base of the ear, which was less than five millimeters from the brain.

April 12, 1915, a large male white rabbit (Fig.1) that had been removed six months previously to another rabbitry, was reported to be acting in a very similar manner to the rabbit just described. Examination disclosed the same parasite, *Psoroptes cuniculi,* working parasitically in both ears. The ears were slightly swollen and when touched even gently, the rabbit plainly resented it by drawing away, and shaking his head, whereas formerly he invariably manifested a desire for being stroked. All symptoms in this case were present as

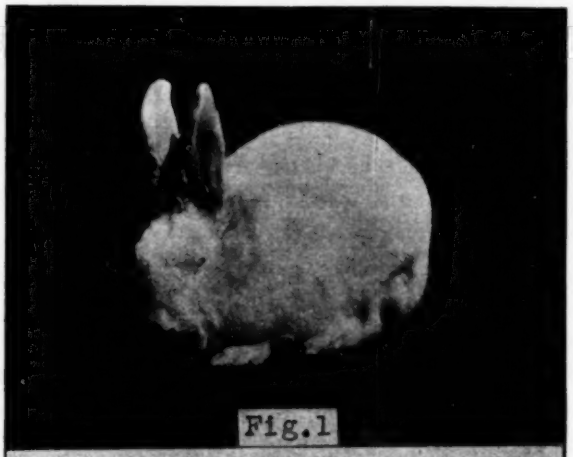

Fig. 1—Rabbit affected by *Psoroptes cuniculi* Mégnin. Died three days later. Original.

Fig. 2—Section of rabbit skull, showing basal cavity of ear, in middle of which are numerous mites, crawling over mass of waste material, composed of wax, skin, dead mites, hair, cast skins, and blood. Original. Highly magnified.

Fig. 3—Check rabbit: A brother of rabbit shown in Fig. 1. Original.

in the gray rabbit previously considered, and the disease was considered too far advanced to warrant treatment with an ultimate view of saving the animal. Three days later the rabbit died, and a necropsy performed by Dr. Buckley, gave the same results as did the necropsy in the first case. Figure 1 gives a characteristic pose of a rabbit affected with *Psoroptes cuniculi,* while Fig. 3 shows a brother of the rabbit in Fig. 1, and illustrates a normal rabbit in his characteristic, alert, and animated pose.

This second diseased rabbit, like the gray one, was a self-constituted leader of the others, always first to give the alarm, and possessed superior strength and pugnacity. Indeed the two having about the same weight had by accident been liberated in the same runway and were found in an exhausted condition form fighting, neither rabbit having been severly injured.

In regard to the two mite-infested rabbits, it is not a little singular that both were the strongest rabbits, as stated above, and that when of the same weight they fought to a finish without either being injured, the gray being the aggressor and the white successfully warding off attack. The weaker rabbits, all of which were examined, showed no signs of mite attack. There is a possibility of either having been infected first, but presumably it was the white one, because his mother had an affliction of the ear which was casually pronounced cancer but which might have originated in mite infection. During the quarrel of the two rabbits some mites might have been transferred from the white to the gray, since the white one showed more or less inflamed ears and shaking of the head for at least six months before discovery of the infection of the ears.

Probably many cases similar to the two just described exist today in the United States among rabbit fanciers, but as these animals seldom bring remunerative prices, epizootics of various kinds are altogether too frequently neglected. The writer is of the opinion that this parasite can be greatly curtailed and perhaps entirely subjugated with a little concerted effort on the part of the fancier, if it is not permitted to go too far unnoticed.

In connection with the above species of mite, the writer desires to mention here another European mite, determined by Mr. Banks as *Listrophorus gibbus* Pasquest, and found by Mr. W. H. White, in the hair of a white rabbit kept in an adjacent pen to the gray one previously discussed. According to Mr. Banks, this is the first record he has of the occurrence of this mite in America.

WHITE SCOURS OF SUCKLINGS

HENRY MARSHALL, Richmond, Va.

SYNONYMS: Diarrhea or dysentery of sucklings, calf dysentery, diarrhea neonatorum, infectious diarrhea.

Dysentery of sucklings occurs in new-born animals during the first days of their existence. It is an acute infectious intestinal inflammation characterized by profuse diarrhea and great exhaustion.

HISTORY: The cause of this very dangerous and ravaging disease was unknown until recently. In olden times it was thought to be due to dietetic errors, alterations of the milk, incorrect feeding of the mother, certain climatic conditions, etc. Obich in 1865 was the first to call attention to its infectious nature. Roloff in 1875 proved that it is transmissible from stable to stable. The recent investigations of Peels, Joest, and Jensen have confirmed these findings and brought out much interesting data with special reference to the etiology of the disease.

OCCURRENCE: The disease is usually present in districts where intensive agriculture is practiced, being more prevalent in the spring and fall than in the winter and summer. It usually exists as a stable contagion. Calves are most frequently affected. However, the condition may appear in foals, lambs and pigs, and in rare instances also in puppies and kittens. In some localities it is a very common disease. When this affection and contagious abortion exist in the same stable, as sometimes happens, the rearing of calves is a difficult proposition.

ETIOLOGY: Calf dysentery has been very carefully investigated and the conclusion has been reached that, in most cases, this condition is caused by one or more virulent varieties of the colon bacillus.

The *Bacillus coli communis* appears as a short, comparatively thick, rod-shaped or slightly oval bacterium. It is aerobic, motile, and provided with one or more flagella. It stains uniformly with aqueous solutions of the aniline dyes, but does not stain by Gram's method. It does not form spores. The bacillus grows upon gelatin but does not liquefy it. On agar it grows in the form of gray transparent colonies which later become white. On potato, a thick growth appears of a gray color, changing later to brown. It causes

milk to sour and to coagulate. It produces indol and hydrogen sulphide, as a result of which an unpleasant odor is produced in the culture. In a saccharated culture medium, the bacillus produces an alcoholic fermentation. The colon bacillus is almost always present in the intestinal canal of most animals.

PATHOGENICITY: Colon bacilli obtained from cadavers of calves which died from the effects of calf dysentery exert a severe pathogenic action on new-born calves. If a one-day old calf is given a few cubic centimeters of the bouillon culture of these bacilli mixed with milk, fever and diarrhea will appear on the following day, and the calf will die of white scours in a few days. The same results are obtained from rectal injections of 5 c.c. of such cultures, and at times subcutaneous injections will produce like results. A fatal infection, per os, is more easily produced in calves which have never partaken of any feed than in those in which the stomach and intestines have performed their functions. This is explained by the supposition, that the colon bacilli pass unchanged through the stomach, which has not yet produced any gastric juice, and multiply rapidly in the meconium which is present in the intestines, furthermore the mucous membrane of the intestines is very permeable in such animals, because the epithelium at this time does not possess a well developed mucous layer.

In the intestines of calves which have died of dysentery, colon bacilli are present in great quantities and often in almost pure culture, moreover the bacilli can be found in the organs and in the blood. Colon bacilli obtained from this source agree morphologically with colon bacilli obtained from the feces of healthy calves, however, they differ from the latter by being able to exercise a violent pathogenic effect on calves.

According to Jensen, pathogenic colon bacilli are facultative parasites which enter the digestive tract with the first milk or with other substances, as soiled mucus. Under normal conditions, these multiply moderately in the intestinal tract, are unharmful, since they are not able to attack the mucous membrane of the healthy intestine. If, however, the natural resistance of the tissues is diminished by cold, improper food, certain drugs, etc., then the bacteria pass into the walls of the intestine, later into the more distant organs, and finally into the circulation and thus produce the disease. He considers this lowered natural resistance of great importance, since he succeeded in producing the disease by feeding

substances which had a weakening influence only on the intestinal wall, such as creolin, pyoktannin, trichloride of iodine, and even boiled milk. Colon bacilli which have acquired virulence in the animal body retain it for that species of animals.

In some cases other bacteria have been demonstrated to be the cause of calf dysentery, as the *Bacillus aerogenes,* paracolon bacillus, and *Bacillus pyocyaneus.*

According to the investigations of Hecker and Baldrey, dysentery of the new-born of other species of domestic animals is probably caused by the same bacteria that produce it in calves.

NATURAL INFECTION: At times the disease appears among the animals in stables, which have been previously free of the disease, and it may appear without the introduction of the disease from outside sources. Such cases usually result from the lessening of the natural resistance of the animal. For example—dietetic errors.

In infected stables the specific contagion exists in the vagina of the cow, in the soil of the stable, or in the bedding; it reaches the external genitals, and the udder of the mother. The calf is usually infected while sucking the soiled udder, or by licking the stable walls, bedding, etc. In rare cases the infection may occur through the umbilical cord. The evacuations of the diseased animals infect the stable and its surroundings, rendering the same dangerous to animals born later.

New-born animals, fed artificially, may become infected by means of contaminated vessels, or hands of attendants.

From Kitt's experiments it appears that intrauterine infection is even possible.

The susceptibility of the new-born to the disease diminishes rapidly as the suckling becomes older. The disease appearing as a rule from 24 to 48 hours after birth. The development of the disease is favored by such predisposing causes as poor nutrition, congenital weakness, and the feeding of boiled milk to the new-born in lieu of colostral milk. Other predisposing causes are alterations of the mother's milk, due to too high, or too low fat contents, or as a result of feeding the mother oil meals, swill, etc.

PATHOGENESIS: In the intestinal canal of sucklings numerous bacteria wander in the mucous membrane of the small intestines, in the lymph spaces, and lymph follicles. These migrations are easy during the first days of life, because the epithelium at this time lacks the mucous layer, which prevents, to a certain degree,

the penetration of the tissues by the bacteria. The bacteria pass from the intestinal wall to the mesenteric lymph glands, and produce an acute swelling of the latter, later they reach the blood stream and circulate through the entire body.

According to Jensen, calf dysentery is not a simple inflammatory condition of the digestive tract, but an inflammatory process, complicated with a septicemic condition, produced by the entrance of the bacteria into the blood stream. It is also probable, that the symptoms of the disease are produced in part, through the toxic products of the bacteria.

MORBID ANATOMY: The cadaver is greatly emaciated, and anemic. The tail and surrounding parts are soiled with fecal matter. The mucous membrane of the rectum is often protruded. The mucous membrane of the stomach, especially around the pylorus is inflamed, edematous and covered with mucus. The small intestines contain watery fecal matter mixed with mucus and gas, the odor of which is very offensive, while the color is yellowish or dirty gray, occasionally streaked with blood. The intestinal mucous membrane is injected and covered with mucus. The submucous and muscular coats of the intestines are edematous. Similar changes in less degree are also found in the large intestines. The mesenteric lymph glands are always swollen and often contain small extravasations of blood. The parenchymatous organs are pale, due to the general anemia. The spleen is rarely enlarged. An acute edema of the lungs, or a circumscribed pneumonia is occasionally present. The serous membranes especially the pericardium, and endocardium show petechiae. The muscles are flabby, lusterless, and of a muddy red color. As a rule the liver, spleen, and kidneys show no gross alterations. The above described lesions are not well marked in all cases. They may be slight even in cases where the pathogenic bacteria are found in all the organs, and even in the muscles. It is claimed by some that the pathological alterations are dependent upon the cause of the disease, differing from the above when the cause of the disease is bacteria other than the colon bacilli.

SYMPTOMS: The symptoms of white scours are similar in all species. The first symptoms usually appear before the new-born animal is three days old, at times they appear a few hours after birth, and occasionally not until after the 4th or 5th day of the animal's existence. The new-born animal stops sucking, is depressed, standing in one place, or lying upon the ground much of the time.

On the first, or not later than the second day of the disease, a watery diarrhea appears, which possesses a very disagreeable odor, in foals, and pigs the color of the fecal matter is a yellowish brown, in calves, white, and in lambs, yellowish, changing later to a grayish white. At times the fecal discharge is tinged with blood. The tail and adjacent parts are soiled with the discharges. In the beginning of the disease, defecation is accompanied by severe pains, later it is painless, and near the end of the disease it is involuntary. In foals symptoms of colic are frequently observed, as trotting movements, pawing with the front feet, looking at the abdomen, or drawing the feet under the body. Similar symptoms are observed in calves, but in a milder form. The abdomen may be distended, or tucked up. The appetite is lost. After defecation the patient stands with feet placed together, back arched, head drooping, or else it lies motionless upon the ground. Weakness increases rapidly, the eyes sink in their orbits, the cornea loses its lustre, saliva drips from the mouth. The hind legs are spread apart, the hair is harsh, the skin of the extremities is cold and clammy, the body gives off a disagreeable odor. Finally the greatly emaciated animal is exhausted and death ensues.

In the beginning of the disease the body temperature is 2 to 4 degrees Fahrenheit above normal, but with the appearance of weakness the temperature falls, and just before death it is sub-normal. Respiration is superficial, and in the later stages rapid. The pulse is frequent, and weak, and at times scarcely perceptible. In some cases inflammation of the joints develops, also indications of septicemia.

Course and Prognosis. As a rule the disease runs a very rapid course, death may occur on the second day after the appearance of the first symptoms, in exceptional cases it may require 10 days to run its course. The prognosis is very unfavorable. Frequently all of the affected animals perish. The losses are rarely less than eighty per cent. Those that survive often remain weak, or sickly, for a long time. Unfavorable signs are bloody diarrhea, and the rapid falling of the body temperature. The age of the affected animals also has an influence upon the prognosis, being more unfavorable in very young animals. The infection may be retained in a stable for years, the high mortality is partly due to catarrhal pneumonia, which is a frequent complication.

DIAGNOSIS. The diagnosis is usually easy, and is based upon the appearance of the disease shortly after birth, the depressing character of the affection, the intense diarrhea, and the infectious nature of the disorder. It is to be differentiated from simple acute gastro- intestinal catarrh produced by dietetic errors. The latter disease usually appears in older animals, and generally exists in a milder form. Septicemia of new born animals produced by infection through the umbilicus, is distinguished by the diseased condition of the navel, and by the appearance of inflammatory processes of a metastatic nature, especially in the joints.

TREATMENT. Prophylaxis is of the greatest importance. It consists of perfect cleanliness during parturition. This includes cleaning and disinfection of the stable at frequent intervals; an abundance of clean bedding for the parturient animal; cleanliness of the hands of stable attendants, etc.

If the disease has already appeared in the stable, it is advisable to remove the pregnant animal to a clean stable, two or three weeks before she is expected to give birth. It is also advisable to disinfect the litter and vagina of the mother, both before and after parturition. The udder, tail and external genitals of the cow should be thoroughly clean. The new-born animal should be handled in a perfectly clean manner. Its first food should be colostrum, which because of its laxative properties will assist in the passage of the meconium. The young should be kept in moderately warm, clean places free from drafts.

Poels recommends the following method of handling the mother and her offspring to prevent calf dysentery.

The external genitals, the tail and the udder of the mother are washed with a 3% creolin solution. The vagina is irrigated with a solution of corrosive sublimate, one to 5,000, or with copious injections of tepid water. The calf is caught upon a clean sheet, the umbilical cord is ligated close to the abdominal wall, severed and the stump is painted with a 5% solution of potassium permanganate. The mouth of the calf is washed and a closely-woven muzzle applied. As soon as possible the calf should be permitted to suck out the colostrum. However, it is recommended to first draw from each teat a small quantity of milk which should be mixed with a disinfectant or otherwise rendered innocuous and discarded, as the milk near the orifice of the teats may be infected.

The milk may also be drawn into clean vessels and fed to the calf immediately after birth, and again ½ to 1 hour later. The muzzle is removed only during sucking or feeding. By this method, which may also be applied to foals, the disease is said to have been eradicated from many farms where formerly all calves died.

Evers has obtained good results by placing the young calves in a clean box or crate where they are held for 4 or 5 days, in the meantime they are fed with milk obtained from their mothers.

In the treatment of calf dysentery many drugs have been recommended from time to time. After isolation of the affected animal it is important to administer a mild cathartic, castor oil being especially recommended for this purpose. Dose of castor oil for calves and coals is 1 to 2 ounces. After the action of the cathartic, barley water, lime water ½ to 1 pint, linseed tea or other mucilaginous preparation should be administered, combined with opium, chalk or magnesia, if desired. Hertwig's Mixture is recommended. It is composed of Powdered Rhubarb Root 4 grms. or 1 drachm, Magnesium Carbonate 1 gm. or 15 grains, Opium .3 gm, 5 grs, and Camomile tea 100 cc. or 3 oz., to be administered at one time to the calf.

Of the intestinal disinfectants, salicylic acid (5 to 30 grains), naphthalin (15–30 grs.), salol (1–2 drachms), creolin (10–30 minims) also in enémas in 1% solution, enémas of starch flour and laudanum are also useful to relieve the straining.

As an abortive remedy the intravenous injection of collargol is highly recommended. (¾ of a grain to 1½ drachms of ½% carbolic solution).

Eggs, wine, strong coffee, or subcutaneous injections of caffein are useful in combating the weakness.

Dr. Eber of Leipzig has successfully treated a great number of cases with a subcutaneous infusion of a slightly alkaline physiological salt solution. (.8% sodium chloride and .25% sodium carbonate). Two quarts of this solution are injected into the subcutis of the neck with the aid of a canula, rubber tube and funnel. The infusion may be repeated in from 2 to 5 hours if necessary.

The excrements of the affected animals should be destroyed, as they contain the infective agent.

IMMUNIZATION: Since it is recognized that various species of coli bacillus are responsible for this disorder, immunizing sera have been prepared by different investigators for combating the disease.

It has been found that a polyvalent serum is most effective, since various species of the colon organism are associated with the etiology of the disease. In most instances, the results from the use of such serum have been most gratifying. Very satisfactory results having been reported by various practitioners. By its use Jensen succeeded in reducing the mortality in herds on numerous premises where the disease had prevailed in a malignant form from 100% to 0%. These results were obtained without the inauguration of any other protective measures.

Raebiger had only one death among 62 calves treated with such a serum; he also reports 278 inoculations on previously infected premises in which none of the calves have become affected since this treatment has been adopted.

White scour serum is now being commercially prepared in Europe and in America. According to the manufacturers this serum is indicated as a prophylactic in calves coming from herds in which calf dysentery is present. Calves thus exposed should receive 10 to 20 c.c., subcutaneously. Those that become infected soon after birth should immediately receive a hypodermic dose of 10 c.c., to be repeated in several hours, as indicated by the symptoms. For curative purposes for calves suffering from white scours in a more or less severe form, not less than a 20 c.c. dose should be promptly injected to be followed by injections of 10 c.c. of the serum at intervals of 6 to 12 hours, depending upon the symptoms.

It should be remembered that organisms other than the *Bacillus coli communis* may, in occasional instances, be the causative factors in this disease, and that a serum based on immunization with the colon bacillus will not be of value in such cases.

Dr. J. F. Winchester of Lawrence, Mass., has framed a bill to come before the Massachusetts legislature relative to the inspection of cattle so as to provide that any cow placed in quarantine shall not be released until a tuberculin test is given, and that all native cattle sent into the stock yards at Brighton, Watertown and Somerville be tested as foreign cattle or cattle brought in from without the state. Dr. Winchester declares that it is really a pure milk bill and means the further conservation of the lives of human beings, especially children. The bill has been indorsed by the anti-tuberculin league and committees from other important organizations of Lawrence.

CLINICAL AND CASE REPORTS

TRAUMATIC PERICARDITIS WITH COMPLICATIONS AND SURGICAL REMOVAL OF THE CAUSATIVE AGENT

W. F. Burleigh, D.V.M., Clemson College, S. C.

That we, as assistants of Nature in her healing art, should at all times have confidence yet not over-confidence in the results of her silent workings, whether suspecting success or failure, was impressively manifested to me while in attendance upon the case herewith described.

In the early part of last June I was called a considerable distance from my office to attend one of a number of valuable cows in a dairy herd in Madison County, N. Y. According to the owner this animal during the three weeks previous had shown symptoms of inappetence followed by loss of condition and a failing milk supply. At the end of the second week a hot and painful swelling about the size of an apple appeared on the left thoracic wall immediately posterior to the point of the elbow. The animal preferred to remain inactive a greater part of the time.

At this time a local practitioner was called who, according to the owner, gave the animal but a cursory examination and pronounced the disease black-leg with recommendation of immediate slaughter. This, however, the owner refused to do, when two or three days later he enlisted the services of another veterinarian (non-graduate) who pronounced the disease acute indigestion and prescribed treatment. No arrangements were made to treat the local swelling.

Upon my arrival a few days later I found that the animal had been removed from the stable and placed in a horse stall where she stood breathing with apparent difficulty and frequently emiting slight groans which were in harmony with the respiratory movements of the chest walls. The left forward leg was extended to accommodate the presence of a swelling of approximately eighteen centimeters in diameter and nine centimeters in depth which was situated on the inferior border of the chest wall immediately posterior to the humero-radial joint of the extended limb. The swelling had the appearance of a large abscess and was hot and painful.

Compelling the animal to move about apparently increased its suffering. Temperature 100.5, respiration 20, pulse 70, not very weak.

Exploration of the interior of the swelling by means of a trocar revealed the presence of a very fetid, dirty brown liquid. After a very guarded prognosis I advised the owner of the necessity of an operation for the purpose of releasing this fluid and exploring the abscess cavity for the possible presence of foreign bodies.

With the animal in the standing position an incision was made about one and one-half inches in length directly over the most prominent portion of the swelling. There at once occurred a discharge of about one pint of very fetid fluid which was immediately followed by a very considerable hemorrhage rather alarming in its proportions.

A digital examination to locate the origin of the hemorrhage revealed the presence of several bone sequestrae from the sternum which were about two centimeters in diameter. These were at once removed and further search revealed an opening through the sternum which directly communicated with the thoracic cavity. While exploring this opening my finger came in contact with the heart, whose movements were very marked. Further investigation revealed a hard object lying in the pericardial sac in close proximity to the apex of the heart and which upon removal proved to be a blackened ten-penny wire nail.

The hemorrhage was now very pronounced, the blood flowing freely in a stream of about one-half inch in diameter. Remarking that the cow would probably die in a very short time I cleansed the abscess cavity with cotton swabs and antiseptic solution and firmly packed the opening with cotton gauze to prevent further hemorrhage, externally at least.

Since the hemorrhage apparently had its origin at some obscure point in the interior I had visions of the blood flow being thus checked to quickly fill in around the heart and clotting there to seriously interfere with its action. This, however, did not occur and I concluded that the gauze exerted sufficient pressure to check the hemorrhage.

At this time the animal was trembling considerably. The respirations and pulse were very rapid, this being due probably in part to excitement.

After administering stimulants and arranging for proper nursing and medication, I left with instructions to be called in the morning if the cow was still alive. I felt confident, however, from her general appearance, that she would not be. It was two days before I heard from the case when the owner called me over the telephone stating that the cow was still alive and seemed to be feeling better.

Upon my arrival I found the animal apparently comfortable, standing quietly, and having a little appetite. The udder was inactive. Temperature 100.5, respirations 30, pulse 60, fairly strong. The gauze pack had come away from the opening of its own accord and a slight discharge of dirty brown fluid was still present. The swelling was somewhat reduced in size and inflammatory intensity.

As this farm was of such a distance from my office that daily attendance upon the animal was economically prohibitory, I decided to allow the owner to treat the local wound and administer medicine orally according to my directions and to inform me from day to day of any changes that he might notice in her condition.

It was nearly three weeks before I again heard from the case when the owner called at my office and informed me that the cow had improved to such an extent that her appetite was nearly normal and the quantity of milk gradually increasing. The surgical wound was yet open from which there was a little fetid discharge. The swelling was largely reduced and the pain apparently completely subsided.

A later history I have unfortunately been unable to secure, yet the ultimate result of this particular case is perhaps immaterial from the view-point of the rough handling that certain of the vital organs may withstand and yet continue at their work. In this case a rather severe local infection was present in the swelling. Certainly a portion of the thoracic cavity must have become contaminated at least where the nail was present.

It suggests to me the possibility of favorable results in surgical interference in at least a few of the cases of traumatic pericarditis when the diagnosis is made sufficiently early to avoid the sequelae of marked general systemic disturbances.

"ACUTE LEAD POISONING IN CALVES"

C. J. Hoyt, Walden, N. Y.

Two calves, pastured in an orchard adjoining a farmhouse, were seen and fed at 6:00 P. M., and at that time showed nothing unusual. One hour later the owner saw them and noticed the first calf walking unsteadily and the second calf having slight convulsions. These symptoms increased rapidly and I was called. Upon arrival one hour later, I found first calf dead and second calf in a very excitable condition, salivating profusely, sweating, having spasms of the muscles in the head and neck, trembling and throwing itself upon the floor and staggering to its feet. These symptoms increased for twenty minutes, when the calf died.

I diagnosed the cases as acute lead poisoning upon which the owner told me there was no lead in the pasture field. I told him I would return the next morning to hold a post-mortem, and search the pasture for lead. Post-mortem revealed nothing but the pasture revealed a small pool of water which had seeped up from a cess-pool or drain connected with the kitchen sink by 18 feet of lead pipe. One quart of this surface water was obtained, also one quart of liquid from each calf's stomach. The three samples were forwarded to L. J. Cross, chemist at Cornell University, who returned a report saying that all three samples were laden with lead.

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"PURPURA HÆMORRHAGICA" IN THE HORSE WITH "ADDENDA" OF ALLIED AFFECTIONS

Fred. C. Mahon, M.R.C.V.S.

One subject was a thirty-year-old bay mare "which had not previously had a day's illness"—according to the owner. Grazing on herbage already invaded by some Army and other animals the mare had suffered severely from strangles—febra-pyogenica—was evidently invaded by the poison, and to such an extent that at one time I feared dissolution. The parotideal swelling, and resultant abscess after blistering and opening of same, took on a bad ulcerative process, the cavity measuring 13 in. in circumference at one time. Throughout the seizure the appetite was never remiss,

and temperature did not exceed 104.3° F. In this case my treatment was by tonics, as acid nitro-hydrochloric dil., liq. ammon. acet., and infusion of gentian in scalded hay, chaff, corn, and bran. In lieu of cantharides, or mercurial blister, I used repeatedly mustard oil, an agent I use extensively.

I gave hypodermically injections of strychnine and electuary of potass. iodidi, belladonna, and glycerine.

As an attack of purpura supervened on the tenth day I had recourse to adrenalin—my sheet-anchor in almost all cases—but if asked to explain why such good results follow in my experience I am afraid I cannot give a precise reply. Whilst writing of adrenalin "and its use in purpura," etc., let me quote a very able American writer, observer, and clinician (*vide* "Veterinary Materia Medica," fifth edition, p. 10—Parke, Davis and Co.).

Dr. J. H. King, of the Kansas City Stock Yards, states in "Veterinary Notes" of December, 1908, p. 12, that he finds adrenalin is a reliable means of diagnosing the presence of "heaves" (broken wind, asthma, emphysema of lung tissues). Even though the horse has been drugged with stramonium or other sedative, he says: "I noticed that upon injecting intravenously 30 minims of adrenalin chloride solution in ½ oz. of normal salt solution the breathing became accelerated in about one minute, and if the animal was only slightly affected with the disease it would immediately show the double respiratory act, or double abdominal breathing, accompanied by the usual action of the costal muscles unabated for several minutes. I have used adrenalin chloride as a diagnostic agent for the past three years with the greatest confidence. In order to verify my diagnosis, I have kept track of these cases, and have always found afterwards that I was correct."

I refer to these notes as it was by accident in using same in Case No. 2 of purpura in another aged mare on the farm where my thirty-year-old "nag-mare" had strangles, followed by purpura and broken wind setting in suddenly, that after the first injection of 90 minims of adrenalin chloride my patient's breathing became normal, and this condition remained so for thirty-six hours approximately, and with the hemorrhagic infarctions, petechial spottings of the mucous membranes, and edema, the broken wind was again noticeable. This to my mind opens up a serious question as to whether fraud is not possible by injections of horses prior to sale, and particularly if put to the crucial point. Post-mortem results

and chemical analysis would not afford the practitioner or purchaser of a broken-winded horse much satisfaction, if at all.

Briefly, Case 1, a twelve-year-old mare (heavy van), cardiac weakness marked, temperature 98.6° F.; pulse, submaxillary 68 per minute, cardiac 90; both small, weak, intermittent; edema of all four legs, causing animal to remain a fixture in her stall. Head pendulous for two days, and animal stupefied, forcing head into a corner, and remaining in this position for hours. Here adrenalin repeatedly used. Saved this case. In fact, I have only attended her for a week. Value originally knacker's price. To-day worth £20.

Case No. 2.—Thirty-year-old "nag-mare." Here again chief agent used adrenalin. Results marked. Recovery.

Case No. 3.—Thirty-year-old "cart mare." Purpura and broken wind. Again adrenalin chloride effected wonders, and I attribute recovery entirely to its judicious use.

Case No. 4.—Peculiar from onset. Diagnosis, "lymphangitis." Near hind limb markedly so. Off hind slightly. On third day knuckling over of near hind fetlock. "Dead lame." Shoe removed. No mischief apparent. Soap and iodine liniment, injections twice daily of adrenalin chloride 60 minims, liq. ammon. acet. in drinking water, bran mashes, linseed boiled, also linseed tea. One injection of physostigmine. No drenching. Recovery on tenth day and at exercise. Work in three weeks from seizure. One noticeable feature of this case was a symptom as if the animal had had a paralytic stroke. I believe some clot of blood or clots had formed in the renal vessels at one time, as the urine collected on three occasions showed on examination broken-down urine casts and red blood corpuscles. Here I used thermofuge to the loins, covered with wool blanket, and surcingled well.

How is it that "adrenalin" is so marked in its physiological actions? Summarizing the conditions in which it is used by surgeons scattered throughout the globe, I find mention of it in *post-partum* hæmorrhage, epistaxis, hæmoglobinuria, lumbago, gravis conjunctivitis, laminitis, parturient laminitis, collapse following gun-shot wounds, keratitis, and other ocular diseases, azoturia, chronic hæmorrhagic nephritis, purpura hæmorrhagica, pleural effusions in the dog, and heaves (broken wind), and if one searched closely the pages of veterinary literature no doubt its employment may be noted in scores of other cases. In passing, I wonder if the

sister profession uses it as we veterinarians do. Their records should prove interesting in the extreme.

To my mind it is a potent agent for good, and has revolutionized the treatment of many diseases, so should be glad to have records of its use and cases treated, recorded fully and more ably by the pens of the ready writers of our profession.—*Veterinary Journal.*

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THE EYE AS AN INDICATOR OF DISEASE

A. Saperstein, D.V.M., Spokane, Wash.

The veterinarian, unlike the human practitioner, cannot interview the patient. The veterinarian must diagnose by physical manifestations. Hence to be a good diagnostician, the veterinarian must be a close observer.

Experience and observation teaches us that every possible condition which causes disease produces abnormal reaction in each organ of the body. This reaction varies in degree—be it slight to very severe, the change is there for the trained diagnostician to note.

The more complex and highly organized an organ is, the more sensitive it is to systemic disturbances. Inasmuch as the eye is the only highly organized organ that is located externally, it should therefore be our best indicator. Just as the galvanometer can detect very minute electric currents, so the eye records the slightest disturbance in the animal body. The eye, however, goes one step farther. To the trained observer it indicates what may be the active cause.

Those of you, who have not paid any attention to the eye as a diagnostic agent will be surprised to note the variations it will undergo in ill-health. The following are some of the changes that have been observed:

The wild look.
The anxious look.
The dull look.
The starry look.
The bulging eyeballs.
The sunken eyeballs.
The glistening cornea.
The lusterless cornea.
Temporary partial blindness.
Temporary blindness.
Eyes swollen shut.
Sclerotic coat may be congested.

Sclerotic coat may be hemorrhagic.
Lower eyelids may be edematous.
The eyes may discharge mucus or pus.
Tear ducts may be occluded.
The eyes may be affected with parasites.
The eyes may be flooded with tears.
Pupils may be dilated.
Pupils may be contracted.
The eyes may be aching.
Tumors may be found on the conjunctiva and nictitating membrane.
The conjunctiva may be hemorrhagic.
The conjunctiva may be in the following state of discoloration:
1. Yellow; 2. Yellow-pink; 3. Yellow-red; 4. Brown-red; 5. Blue; 6. Blue-red; 7. Pale or anemic color.
Intermittent twitching of the conjunctiva.
Intermittent twitching of the eyelids.

Various combinations of these physical manifestations may occur.

Very little has been done in classifying diseases as to the changes they produce in the eye. All work along that line has been done only in a general way. However, I hope that these few suggestions will stimulate the veterinary profession to a further classification.

HODGKIN'S DISEASE IN A MULE

CASE.—Mule six years old, gray in colour, very large frame, and had been a large and powerful animal in her prime.

HISTORY GATHERED.—Two years ago, writes a correspondent, she had a bad case of "distemper" (which may mean much or nothing) and had never entirely recovered her former flesh or power since. Then about a year ago she began to lose in weight and ability to do her part of the farm work, and twice in the last year she has had enlargements under her "lower jaw." The first of these enlargements decreased in size for a time, but the last would not decrease. Her appetite was capricious, and she continued to lose in flesh, and when put to work would soon tire and have to be taken out and let rest for a few days.

She was brought to me for diagnosis, prognosis and treatment. I found the submaxillary lymphatic glands to be very much enlarged, from the size of a hickory nut to the size of an orange, and the pectoral lymph glands could be felt to be enlarged, also as well as all of the lymphatic glands that it was possible to palpate. The pulse was rapid, 68; temperature, 104; and respirations, 25. But I thought that some of the disturbances might have been caused

by the long walk that she had in coming to my place—about eighteen miles. She was thin in flesh, hair rough in appearance. When she brayed, the voice was not normal, but more of a shrill nature as though the pharynx was partially occluded.

My diagnosis of her case was Hodgkin's disease, or generalised lymphadenoma, and that the probability of her living a week was very doubtful, that death was sure and certain as the disease was incurable. He wanted her treated, regardless of my prognosis. I began treatment, which consisted of the administration of strychnin and Fowler's solution.

After two days' stay at my barn she got very restless, and finally got down and could not get up without assistance, and the next day she could not stand up after she was assisted to get up. The following day she died. The post-mortem lesions were the most typical I have ever seen. Beginning at the pharynx was a continuous chain of enlarged lymph glands, through the mediastinal glands, the diaphragm, and along the aorta posterior to where the iliac arteries are given off. Then all the lymphatic glands of the intestines, spleen, liver and parietal walls of the abdomen were enlarged from the size of a nut to the size of a football. The sternum and lungs were deeply involved. On palpation, the glands were rather firm and hard, and on section the glands presented a grayish white semi-translucent appearanee, broken by intersecting strands of fibrous tissues, and there was no necrosis or caseation of any of the glands.

Her appetite remained only fair until she died. Her bowels and kidneys functionated about as normal.—*Veterinary News.*

Published accounts state that glanders has broken out in a number of horses and mules purchased by the British government and held at the Newport News, Va., stock yards. Dr. Ferneybough, the state veterinarian, states that out of 102 suspects twelve mules and horses have been killed.

It is reported that a number of valuable horses have died in the vicinity of Albion, Mich., through an attack of a peculiar disease which has not been diagnosed.

ABSTRACTS FROM RECENT LITERATURE

UNUSUAL SEQUEL OF CHLOROFORM ANESTHESIA. Henry Taylor. *Veterinary Journal.*—A spaniel bitch, about 5 years old, had a mammary tumor, as often seen in such animals. It was the size of a tangerine orange and the owner wished it removed. Placed on the operating table, the dog being muzzled with a piece of tape, the chloroform was administered by means of a sleeve of thin calico, one end fixed on the dog's head and the other regulated to admit proper amount of air. A sponge wet with chloroform was placed inside. The dog took the anesthetic rather badly, slobbered much and when under the effect and the operation about beginning, it was observed as if it was full of wind, the abdomen being apparently tympanitic. Respiration was labored. The chloroform was stopped and the operation rapidly performed. Taken to the fresh air, the dog came to but the abdomen remained distended and the breathing very difficult. The animal looked very sick and made useless attempts to vomit. Notwithstanding treatment, death took place during the night. Post-mortem: Stomach enormously distended with air or gas, the walls being very thin and on being pricked the organ collapsed as if the muscular elasticity was wanting. No other lesions. The extreme distension with interference of respiration and circulation was the cause of death. A. L.

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TREATMENT OF WHITE SCOURS. Dr. Stedefeder. *Berliner Tierarztl. Wochenschrift, Nr. 23.*—It is the opinion of this writer that much importance has been ascribed to certain intestinal infection through bacteria. Therefore the uses of anti-bacterial and certain eradication methods have proven ineffective.

Death from white scours is generally caused by extensive hemorrhages in the intestinal tract. This loss of blood causing an anemic condition in the brain renders the animal unconscious, which if not properly treated results in death.

It is evident that infectious intestinal catarrh is caused by highly virulent bacteria. But owing to the great number of bacteria present in the intestinal tract it is difficult to isolate a specific organism. It is well known that the specific organism must be isolated before an anti-bacterial treatment can become effective.

The writer states that the treatment for this disease should consists of the administration of physiological salt solution, either by subcutaneous injection or per os. MANSFIELD.

A NEW MODE OF INFECTION IN DISEASES OF CALVES. . . Dr. H. Jernack, Berlin. *Zeitschr. f. Fleisch und Milchhygiene, Heft 16, 1915.* The above writer has observed that many cases of calf infection occurs through the umbilical opening, and he has noted in four out of six cases of calf diseases that the origin of the infection came from the urachus patens. In each instance there was both purulent and gangrenous condition of the urachus and bladder.

The kidneys were swollen. The internal organs including the liver and umbilical vein showed no pathological changes. The animals were in a bad state of nutrition.

In calves showing severe urethral, bladder and kidney lesions as well as a general infection it may be safely considered that the original seat of infection was the umbilical opening.

In cases of badly nourished calves where the lesions in the organs are absent it is recommended that particular attention be directed to the bladder as well as the general umbilical region for the point of infection. MANSFIELD.

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CHICKEN CHOLERA. *The Lancet, No. 4816, Vol. CLXXXIX. No. 25 of Vol. II, 1915. December 18, 1915.*—Dr. J. P. McGowan, assistant superintendent of the laboratory of the Royal College of Physicians of Edinburgh, has published through Messrs. Blackwood and Sons a pamphlet on the Epidemiology and Pathology of Chicken Cholera, together with a Discussion on White Diarrhoea in Chicks. Dr. McGowan describes the research carried out by him on behalf of the Edinburgh and East of Scotland College of Agriculture into chicken cholera and the white diarrhoea of chicks. At certain premises where the intensive system of poultry-rearing was used and eggs were hatched in incubators, some chicks died from white diarrhoea in April. In December an epidemic broke out among the hens characterized by discharge from the nose of a glairy mucus, exudate and ulcers in the mouth. In January these symptoms ceased and were followed by a form of paralysis affecting the legs chiefly, and in many cases this improved in course of time and the birds recovered almost entirely. Examination of the spinal cords of the affected fowls by Dr. J. Dawson, neurological histologist, revealed nothing abnormal. The organism which Dr. McGowan obtained from the lungs and heart in a case of white diarrhoea was identical with the chicken cholera organism, and the occurrence of paralysis and catarrh of the upper air passages is symptomatic

of the tendency of action of the members of the haemorrhagic septicemia group—i. e. to fix on certain localitites of the body in certain epidemics. The chicken cholera organism is a saprophyte in soil, manures, and water; it is also present in the air passages and intestines of a large number of apparently healthy fowls. Although it may be present and harmless for long periods, yet a lowered vitality of the bird may cause it at any time to assume a high degree of virulence. The investigator concludes that one outstanding feature of the whole of the haemorrhagic septicaemia organisms (in fowl, sheep, and cattle) is that while they may produce both sporadic and infectious diseases in the adult, they may also cause infectious conditions usually associated with diarrhoea in very young animals. The white diarrhoea of chicks is consequently considered to be caused by the chicken cholera organism, which, like other members of the haemorrhagic septicaemia group, can occasion sporadic cases of the malady at one time and devastating epidemics at another.

REICHEL.

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LONG EPILEPTIC FIT IN A PUPPY. Henry Taylor, F.R.C.V.S. *Veterinary Journal.*—A seven weeks old puppy, was covered with lice. Dressed with a preparation looking like lysol, he was taken with a fit in which he remained for no less than six hours. Bromide of potassium failed to act as the dog was unable to swallow. But after the fit had been on for five hours a few drops of methylated ether were injected sub-cutaneously and at the end of the *sixth* hour he was standing and walking about. The twitching of the head, jaws and neck had lasted without interruption for six hours, the dog being unable to stand all that time. A. L.

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THE OPHTHALMIC TEST FOR DIAGNOSING TUBERCULOSIS IN CATTLE. Prof. A. M. Bergman. *Zeitschrift für Infektionskrankheiten der Haustiere, Vol. 17, Nos. 1 and 2, August, 1915.*—1. After the instillation of 40% glycerin solution into the eyes of cattle there occur in isolated cases a watering of the eye and some secretion of mucus, but no secretion of pus; thus no reaction results which would be confused with the conjunctival reaction to tuberculin by tuberculous animals.

2. With glycerin boullion, which is prepared as the medium used in the manufacture of tuberculin and is handled exactly as a tubercle bacillus culture, being concentrated to 1/10 volume, there

is no conjunctival reaction which would be confused with the conjunctival reaction to tuberculin by tuberculous cattle.

3. The tuberculin of the government veterinary bacteriological institute (at Stockholm), a Koch's tuberculin, made up from 92% bovine and 8% human strains and containing 40% glycerin, has proved perfectly suitable for the ophthalmic test. Of 107 animals tested 87 were checked off as tuberculous and 20 as free from the disease. This was done in 38 cases by autopsy and in addition, where it was necessary, by inoculations, and in 69 cases by thermic tests and clinical and bacteriological examinations. Of the tuberculous cattle 70 reacted clearly to the first ophthalmic test, 11 were doubtful and 6 failed to react. Of the 20 sound animals one reacted. The second ophthalmic test in the same eye gave a true and clear result in all cases; 87 reacted, 20 showed no reaction. The ophthalmic tuberculin test is the best fitted for use after a preceding sensitization.

4. At the first tuberculin test a sympathetic reaction was present in the untreated eye of perhaps 4% of the reactors.

5. The sensitizing effect of dropping tuberculin into the eye of tuberculous animals is clearly apparent if the second administration occurred 48 hours later and especially in cases where the reaction was not conclusive after the first administration. When the second administration was made after 13 days the sensitizing effect was equally apparent.

6. The sensitization rendered clearer the reaction to the second test, and it occurred earlier and disappeared more quickly than at the first.

7. To read the test but once is not enough. If a previous test in the eye has not been made, it is desirable to look for the reaction 8, 12, 18, and 24 (possibly also 30) hours after the instillation.

If the eye is sensitized by a previous instillation, one should make examinations after 6, 12 and 18 hours and if several instillations with short intervals between have been made previously, a thing which seldom occurs in practice, then the examination of the reaction may be made at the third and sixth hours.

8. The tuberculin treatment of one eye of a tuberculous animal often has a sensitizing effect upon the other eye, which may be recognized by the earlier appearance and disappearance of the reaction in subsequent tests.

9. Repeated tuberculin administrations in the same eye at

intervals of 1 to 3 days has caused in tuberculous cattle after at least four instillations a decrease in the capability of the eyes to react. The reaction begins early, as in sensitized eyes, but disappears very quickly, sometimes indeed 5 hours after the administration. A complete cessation of the sensitiveness to tuberculin did not occur after 8 instillations. By such treatment of one eye the other becomes less sensitive in about the same degree as the one treated. The capability of the eyes of becoming somewhat accustomed to tuberculin may be without practical importance since a reaction occurs even if it lasts only a short time and since, on the other hand, it is evident that the normal capability to react returns several days after the cessation of the instillations. Frequent instillations can not be used for fraudulent purposes.

The conclusions reached by Professor Bergman are in accordance with the results which have been obtained at the University of California. However, as indicated in Bulletin 243 of the California Experiment Station, page 134 and 135, our attempt to use the ophthalmic test in the routine testing of dairy cattle has failed to give satisfactory results under California conditions. We believe that the test has a place in veterinary practice, especially in experimental work and in the testing of especially valuable animals where every means of detecting tuberculosis should be used. In this latter instance we advocate the use of the repeated ophthalmic tests before injecting by the combined intradermal and subcutaneous methods.

C. M. H.

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BIOLOGICAL INVESTIGATIONS OF EOSINOPHILIA. Second part: PROPERTIES OF PHAGOCYTOSIS AND ABSORPTION OF VERMINOUS PRODUCTS. M. Weinberg and P. Séguin. *Ann. de l'Inst. Pasteur, Paris, July, 1915, v. 29 (7), pp. 323–346, pls. 6–7.*—Weinberg and Séguin give the following conclusions:

1. The eosinophiles possess phagocytic properties. They engulf inert matter and are capable of destroying in this way not only most of the microbial species, but also protozoa and erythrocytes. However, their phagocytic properties are manifested more distinctly against microbes than against cells.

2. Experiments with *Bacillus subtilis, B. coli,* protozoa and erythrocytes show that the eosinophiles are capable not only of engulfing, but also of completely digesting these elements.

3. Phagocytosis takes place *in vitro* as well as *in vivo* (peritoneum, subcutaneous cellular tissue, circulating blood). When the

eosinophiles are very abundant in the blood, or when they have accumulated at the point of penetration by a microbe, they are capable of playing an important role in the immediate protection of the organism against infection.

4. Although the eosinophiles are endowed with indisputable phagocytic properties, they only play the part of the supplementary phagocytes. Their phagocytic properties have in general passed unperceived because, on the one hand, of their exceptional presence in purulent collections, and, on the other hand, of a customary staining technique for microbes which does not permit of differentiating the various sorts of leucocytes.

5. Eosinophiles which have been in contact with hydatid fluid for one hour at 37°C. no longer manifest phagocytic properties, while the other leucocytes (neutrophiles and mononuclears) remain capable of engulfing microbes.

6. Eosinophiles absorb hydatid fluid. This fluid loses its antigen properties after having been in contact for some time with a suitable number of eosinophiles. It is easy to demonstrate this by the fixation reaction, using fresh serum from a case of echinococcosis and comparing the reactions with normal hydatid fluid and with fluid which has been in contact with eosinophiles.

7. The eosinophiles of immunized animals absorb hydatid antigen more easily that eosinophiles from fresh animals.

8. The absorption of the hydatid antigen by the eosinophiles takes place equally well in the incubator or in the refrigerator.

9. In conclusion, the eosinophiles, like the polymorphonuclear neutrophiles, play an important role in immunity. But while the neutrophiles have for their principal function the protection of the organism against microbes, the eosinophiles are especially adapted to the neutralization of certain toxic substances. They show their phagocytic power in the absence, total or partial, of the polymorphonuclear neutrophiles. Similarly the polymorphonuclear neutrophiles may undertake the absorption of the verminous products in the absence of the eosinophiles.

It is probable that having absorbed toxic products, the eosinophiles play a role in the elaboration of specific antibodies, and Weinberg and Séguin are carrying on researches with a view to determining this point. M. C. HALL.

PYELO-NEPHRITIS IN A COW. W. E. Blackwell, M.R.C.V.S. *Veterinary Record.*—Short horn cow, five months pregnant, presented the following symptoms: suppression of urine, loss of appetite, dullness, disinclination to move, lying down most of the time, passed no feces, during the last eleven days of her sickness. She made frequent and painful attempts to micturate discharging only about half a teacupful of thick blood stained purulent matter. The temperature was 102°, the ears and horns cold, the back arched. The treatment was only palliative. She died after an illness of eleven days. Post-mortem revealed both kidneys enlarged and surrounded by a thick envelope of suet. One of them weighed 12½ pounds. The other only 10. This one was more advanced in disease. Unfortunately the bladder was not examined. It might have shown lesions of cystitis. A. L.

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PECULIAR FRACTURE. Lieut. A. Hoskins, A.V.C. Lame, aged light draught horse had on the outside of the leg, a few inches below the elbow a slight swelling. It was soft and tender to the touch. Fomentations were prescribed but the lameness kept increasing. Evidently an abscess was forming. It was lanced and creamy pus escaped. The following day on examination, there was observed a displacement in the bone and a discharge of synovia from the wound. No crepitation was detected. The animal was destroyed. On autopsy, there was found a fracture of the top of the radius, into six pieces with suppuration of the joint. Inquiry about the horse showed that he had been kicked several days before but the case did not appear serious, the lamenes not having shown itself until some fourteen days after the kick had been received.

A. L.

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ACTIVE IMMUNIZATION TO GLANDERS. A. Marxer. *Archiv f. wissenschaftliche u. praktische Tierheilkunde, Vol 41, pp. 272–285, 1915.*—The author discusses previous attempts at immunization to glanders, and the reasons for the failures. Among these is the fact that the glanders bacillus has singular properties, for example, localized infections will sometimes heal without conferring any real immunity upon the previously infected animal. Previous attempts failed probably because the bacilli lost all their antigenic properties during the killing processes. In the preparation of glanders vaccine, Levy, Blumenthal and Marxer used solutions of chemically indifferent substances, which through their osmotic action brought about an attenuation of the glanders bacilli, with-

out causing any deep seated change which diminished their antigenic properties. For this purpose glycerine and urea were used.

The method of killing is varied, according to the amount of bacilli in suspension. Bacilli at a concentration of 0.1 gram of bacilli in 4 c.c. of 80 per cent glycerin are killed in 14 hours at 37 degrees; at a concentration of 0.004 gram of bacilli in 4 c.c., they are killed in 7½ hours. The above mentioned investigators used such glycerin attenuated glanders bacilli in their experiments on guinea pigs. Best results were obtained when the immunizing dose was injected subcutaneously. A single injection of even small amounts of the dead bacilli was a certain protection against the subsequent infection. Similarly good results were obtained on horses when these received two injections of the glycerinized bacilli, either subcutaneously or intravenously. Each of two horses received 0.1 gram, and three weeks later, 0.2 gram of dead bacilli intravenously; a third horse received a first dose of 0.2 gram subcutaneously and about a month later, double this dose. A fourth horse received 0.1 gram, and three weeks later 0.25 gram subcutaneously. All of these horses were found to be immune when tested against virulent glanders bacilli.

Similar results were obtained by Levy, Blumenthal and Marxer, with glanders bacilli killed in urea solutions. The use of the urea solution has this advantage, that the attenuating action of the solution can be stopped at any desired time, by evaporating the solution at low temperature in vacuo, down to dryness. The powder so obtained is a convenient form of preserving the attenuated bacilli. On the other hand, in order to prevent further attenuation in the glycerine suspensions, it is necessary to add water and keep the mixture cool. This method is not convenient for practical purposes. The urea vaccine may be used in the tropics.

Glanders bacilli, at a concentration of 0.1 gram of bacilli in 4 c.c. 10 per cent urea solution are surely destroyed by 17 hours' shaking at 37 degrees. Guinea pigs were immunized with powdered bacilli or with extract powder. This latter was prepared by centrifuging the bacillary emulsion in the urea solution; the perfectly clear supernatant fluid was evaporated to dryness and rubbed to a powder. The bacilli powder was prepared in a similar manner.

Horses were immunized with urea attenuated glanders bacilli, using 600 milligrams at one treatment or 300 mgs. at two treatments. The protective action was still present after a year's time. There is no temperature reaction after the injection.

Marxer prepared some of his glanders vaccine "Farase" for Professor Dediulin's laboratory in Charkow. This vaccine consisted of glanders bacilli killed by urea. It was tried by Bautz and Machodin on guinea pigs and on twelve horses, two of which horses were controls. The results were in general very good. Some difficulty was experienced with the determination of the minimal lethal dose of the glanders virus for guinea pigs. The horses received two injections of vaccine, three weeks apart. The virus was injected 45 days after the second vaccine injection.

Following these experiments, Dediulin tried the Farase on a large number of horses, over 1000, of very mixed breeds and origin.

One year and four months after the vaccination with Farase, not a single case of glanders occurred among the immunized animals, although in the same locality (Karl-Gute, in Poltava) 14 glanders reactors had to be destroyed. These animals were all allowed to run together. A number of the immunized horses were tested with mallein and reacted negatively.

Four years have elapsed since the vaccination with Farase, and Dediulin states that not a single case of glanders has occurred, although occasional cases occur among non-immunized animals.

From these successful results by Dediulin on a large scale, it is concluded that the glanders immunization by the method of Levy, Blumenthal and Marxer has great practical value and should find widespread application.

Note by Abstractor.—The use of three separate agents to kill the bacilli, though very ingenious, is not new. Marxer, in the above paper, describes the attenuation of glanders bacilli by shaking for 17 hours at 37 degrees, an emulsion of the bacilli in 10 per cent urea solution. In this case the death of the bacilli is caused by the combined action of shaking, mild heat, and osmotic action.

Several years ago a controversy arose over the question of the harmful action of sodium benzoate in foods, especially tomato ketchup. Certain manufacturers A, prepared ketchup with sodium benzoate. Their rival, B, did not use this preservative and extensively advertised the fact that no preservatives were used in their ketchup. But according to A, B's ketchup was effectively preserved by the use of excessive amounts of vinegar (acetic acid), oil of cloves (eugenol) and other spices, and sugar. If used in proper amounts food may be preserved by either vinegar, spices, or sugar. According to A, no one of these was present in sufficient amounts in B's ketchup to warrant the statement that it contained a preservative, i.e., one preservative. But the combined action of the three prevented the growth of microorganisms. BERG.

INTERNAL HEMORRHAGE AS A COMPLICATION OF PROLAPSUS UTERI. Mr. Brissot. *Bulletin de la Soc. Centrale.—First observation.* The writer was called to attend a cow reported having prolapsus of the uterus. She was lying down, her respiration was accelerated, and she was very restless. The protruding organ had an enormous size, there was no congestion, but its appearance that of a heavy bag filled with liquid. It gave a noise and the feeling of undulations when it was displaced and pressed on its surface.

Fearing a serious complication, more minute examination was made and then it was observed that the visible mucous membranes were pale and bloodless, the pulse could not be felt, the horns, skin and ears were cold, the respiration very accelerated, all the symptoms of internal hemorrhage were present, of which the condition of the prolapsus and its fullness were evident proofs. The cow died almost immediately. Tapping of the uterus gave escape to 15 or 20 liters of red blood. Puncture of the abdomen gave exit to what remained in the animal.

Second Observation. A mare was affected with the same complaint, prolapsus uteri. She was rather old, a very nervous animal, and she exhibited great pain. The uterus was enormous and much congested. Held up on a sheet by two assistants, cold water was freely poured over it and reduction by pressure of bandage (the Coculet method) reduction began. While proceeding in the manipulations, it was observed that a certain quantity of fluid, moved in the uterus, as in the preceding case, suspicion of a similar complication was entertained. The mare died during the manipulation.

Post-mortem: the abdominal cavity was found full of blood. On the peritoneal wall of the uterus there was a large ecchymotic spot, surrounding a laceration of the serous and muscular coats, in the middle of which was widely open an utero-ovarian vein. While this was empty and bloodless, its congener of the opposite side was full, dilated andflexuous. The mare had died by the rupture of a large varicose vein. A. L.

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BIOCHEMICAL COMPARISONS BETWEEN MATURE BEEF AND IMMATURE VEAL. William N. Berg. *Jour. Agricultural Research, Vol. V, pp. 667–711, 1916.*—An extended research in which 41 calves, all seven days old or less, when killed, were used. The work may be divided into three parts: (1) chemical analysis bearing on the chemical composition of immature veal: (2) artificial digestion

experiments *in vitro* bearing on its digestibility and (3) feeding experiments using cats as subjects. Portions of ordinary lean beef steak were purchased in a market for use as controls in (1) and (2). The meat of a calf less than three weeks old when killed, is generally regarded as immature.

During the study of the chemical composition of mature beef and of immature veal, no differences between them that are physiologically significant were detected, although large numbers of analyses of a detailed character were made. The claim that immature veal (bob veal) is more watery than beef finds little support in the data obtained. The average water content of beef was (in round numbers) 74 per cent; of immature veal, 77 per cent. The difference of 3 per cent is not regarded as important. The total nitrogen and the various forms in which it is present, was the same for both. Adding the water to the total protein (total nitrogen multiplied by 6.25) 96 per cent of the beef and the veal were alike, the remaining 4 per cent, consisting largely of fat, were not studied.

In a large number of digestion experiments carried out in glass vessels, immature veal digested as fast as mature beef. The speed of digestion was measured by three different methods. At present, it is not possible to measure speed of digestion in the body, hence methods have been developed for making this measurement outside of the alimentary tract, and valuable data can be obtained. Both pepsin and trypsin were used in the digestion. The amounts of the enzymes were varied over a wide range. So small amounts as 0.1 or even 0.01 milligram of pepsin digested beef and veal with equal speed. A few experiments were made in which milk was compared with the veal. Of course, milk proteins, being in solution at the beginning, digested faster than the veal.

Cats chosen at random, were fed on a diet in which immature veal was the sole source of nitrogen. The young animals grew normally on the diet; the older ones became fat. A pair of cats, after living two-thirds of a year on the diet, produced a litter of healthy young kittens, which after the nursing period, continued on the immature veal diet with excellent growth. These experiments on cats covering a long period of their natural lifetime, are very significant. They show that (1) immature veal contains all the amino acids essential to maintenance, growth and reproduction: (2) there were no toxic substances present. The cats (altogether there were 9) were exceptionally fine in their appearance and general behavior.

The work indicates that immature veal, when properly prepared, is fit for human food, especially when its deficiencies in fat and possibly in small amounts of undetermined constituents are counterbalanced in the ordinary mixed diet. BERG.

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INTESTINAL OBSTRUCTION WITH PERITONITIS, DUE TO HEMORRHAGE IN THE FLOATING COLON OF A HORSE. Veterinary Major F. Pagnan. *Bulletin de la Soc. Centrale,*—An eleven year old gelding was taken with colic. He had the symptoms of intestinal obstruction indicated by uneasiness, restlessness, intermittent pain and dull colic. He moved with pain, looked at his flank. His appetite was gone. He laid down with hesitation and groaned slightly. Abdominal percussion and rectal examination were negative. He had no tympanitis and had passed no feces. The treatment consisted in friction, warm blanketing, saline purgatives, pilocarpine. No result was obtained. After three days of sickness death took place. The post-mortem was interesting because of the intestinal obstruction. The digestive apparatus was empty except the stomach and small intestines which were distended and contained liquids mixed with a small quantity of alimentary matter. The floating colon showed in one meter of its length, an abundant hemorrhage between its mucous membrane and the muscular coat. Clots of blood had pushed the mucosa inward so as to form a complete obstruction. At a few points the mucosa exhibited mortification. Acute peritonitis was the consequence of this alteration of the colon and about 10 litres of fluid were in the abdominal cavity with also floating fibrinous membranes. A. L.

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CONTRIBUTION TO THE STUDY OF "ESPONJA" OR SUMMER SORES OF EQUIDAE IN BRAZIL. J. Descazeaux. *Bull. Soc. Centr. de méd. vet., Paris, 1915, v. 91 (19–20), pp. 468–486, figs. 1–3.*

THE PARASITE OF GRANULAR DERMATITIS OF EQUIDAE. A. Railliet and A. Henry. *Bull. Soc. Path. Exot., Paris, 1915, v. 8 (9), pp. 695–704, figs. 1–3.*—Descazeaux has contributed a most important paper to our knowledge of summer sores of horses and closely related animals. Since this disease was first described by Bouley in 1850 as summer sores or granular dermatitis, it has received considerable attention from many workers. Typically the disease is characterized by the presence of ulcerations in the midst of which are caseous or calcareous granulations from the size of a grain of millet to that of a nut. In 1860, Ercolani noted the presence of

larval nematodes in a similar disease characterized by the presence of umbilical crusts. Summer sores, as the name implies, are prevalent in summer and tend to disappear in winter. Descazeaux has given in some detail the clinical and pathological features of the form of this disease which is prevalent in Brazil under the name of "Esponja", the Spanish word for sponge. The most valuable part of his paper, however, deals with the etiological agent of the disease. Ercolani called the worms found by him *Trichina uncinata* and noted that these larval worms resembled the larvae of *Spiroptera megastoma* (now called *Habronema megastoma*) from the stomach of the horse and ass. Buffard, in 1903, studied the larval worms from summer sores and regarded them as the larvae of *Filaria papillosa* (now called *Setaria equina*) from the abdominal cavity of horses, asses, and mules. Rivolta, in 1868, called these worms *Dermofilaria irritans*, and they have been commonly called *Filaria irritans*. Rivolta described the parasite as a worm with a slender tail terminating in an obtuse tip, this tip being armed with very fine spines. Descazeaux has recovered similar worms from cases of "Esponja" in Brazil, and invites attention to the fact that larval worms with tails terminating in spiny tips of the sort found by him and described by Rivolta are not larval filariae in the strict application of the term, but belong in what he calls the suborder Spirurata or the superfamily Spiruroidae (what most helminthologists have regarded as the family Spiruridae of the superfamily Filarioidae). This fact indicates at once that the adults of these larvae are to be sought among the worms of the genus *Habronema*, which are members of the group in question which are parasitic in the horse and its immediate relatives. The three species of *Habronema* parasitic in equines are *Habronema megastoma, H. microstoma* and *H. muscae*. Ransom has shown that *H. muscae* develops to its larval stage in the common house fly, *Musca domestica*, the fly becoming infested as a maggot in horse manure. Infestation with the adult worms in the stomach of the horse may take place through the ingestion of such infested flies, or by the escape of the larva from the proboscis of the fly as it feeds on the moist lips of the horse. In view of these facts, Descazeaux surmises that "summer sores" may arise as the result of flies so infested feeding on the moisture on the skin of the horse. But since embryos found in the umbilical crusts belong to the young stage of Habronema, the embryo which has just escaped from the egg, he proposes for this the following

hypothesis: Embryos of *Habronema* pass out in the manure of equines, penetrate the soiled skin after the fashion of larval hookworms, setting up the inflammatory reactions which give rise to "summer sores", and undergo in the skin, as erratic parasites, the development which would normally take place in the fly.

The suggested prophylaxis consists in the removal of the adult worms from the stomach of the horse by the use of such anthelmintics as tartar emetic and arsenic, the destruction of the embryos in the manure and of flies, and the use of clean bedding. As a remedial measure for the established lesions he recommends the application and injection of 2 to 3 percent trypanblue, though he states that the only truly efficacious treatment is the early and complete ablation of the invaded tissue.

The clinical variations in the appearance of the umbilical crusts, parasitic dermatitis, summer sores, bursati sores, esponja, etc. is a function of the stage of development of the young worm, which may be present in the embryonic stage or in the six succeeding larval stages. All of these forms may be collectively designated as cutaneous habronemosis or cutaneous habronemiasis.

The paper by Railliet and Henry is in effect a resumé, emphasizing before a different audience the importance of the work of Descazeaux. M. C. HALL.

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SUB-PERITONEAL EMBRYOMA CAUSING A DIVERTICULUM AND A FATAL OBSTRUCTION OF THE FLOATING COLON IN A MARE. Professor G. Petit and Mr. Houdemer. *Bulletin de la Soc. Centrale.*—One morning a twelve year old mare was dull, depressed, carrying her head down and her back arched. The visible mucosae were injected. Pulse about normal. There was slight tympanitis. The lips of the vulva were swollen, the vaginal mucosa edematous with small ecchymoses. The valve of the meatus urinarius was swollen and looked as if it was torn. The anus was protruding, somewhat relaxed with its mucosa purplish in color.

A few hours after the symptoms changed. Dull colic, constipation, tympanitis were present. The visible mucosae were becoming cyanotic and there was great dyspnea. Intestinal obstruction was diagnosed and death took place in the afternoon of the same day.

At the autopsy the intestines were found dilated with gases. At the convex curvature of the floating colon there was a voluminous tumor, which had by traction given rise to the production of

a diverticulum and an elbow flexure of the intestine with complete closure of the colon and its obstruction. This tumor weighed 4 kilogrammes and 750 grammes, it was irregular on its surface and when cut through showed spots, irregularly distributed on the outside and also in the center of the tumor. The authors considered it as belonging to the variety of embryomas or teratomas.

A. L.

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GROWTH IN THE LARYNX, Doct. Luigi Menicagli. *Il Nuovo Ercolani.*—This case occurred in a cow. The tumor was situated on the anterior margin of the left arytenoid cartilage and extended on the internal and external faces. The animal was four years old and suffering with difficulty in breathing after walking a short distance. The difficulty increased gradually and soon the cow manifested severe dyspnea threatening suffocation. The minute examination of the throat, neck and thorax was negative. That of the larynx, made with a speculum in the mouth and a laryngoscope, revealed to the writer the presence of a growth on the arytenoid cartilage which to be removed would probably require laryngo-tracheotomy. This was decided. After careful disinfection and the preparation of the field of operation a tracheotomy tube was inserted. The larynx was exposed and entered, the tumor was seized with a pair of forceps, isolated from its position and attachments on the faces of the cartilage by a careful dissection of the mucous membrane, when finally it was drawn outward where it was extirpated. Abundant hemorrhage followed and stopped with some difficulty by plugging. The tracheotomy tube was removed. The wound was closed with sutures and the animal allowed to get up. Careful diet for a few days was followed by rapid recovery.

A. L.

PROCEEDINGS OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

(Continued from page 644)

DR. CAMPBELL: I move to amend that resolution and think that a committee should be appointed leaving the number and selection with the new president. I refer to the resolution in the matter of acquiring the publication.

DR. LYMAN: I rise to a point of order. The point of order is that that was laid on the table until the other motion was taken care of. Therefore, I call for the original recommendation.

PRESIDENT MARSHALL: In my opinion, the original motion should receive attention first.

DR. KINSLEY: Shall we amend that motion? Is not that motion before the house now?

PRESIDENT MARSHALL: There is a motion before the house but how are you going to dispose of the first motion?

DR. KINSLEY: What is the motion before the house

PRESIDENT MARSHALL: The recommendation of the executive committee.

DR. KINSLEY: Cannot that be amended?

PRESIDENT MARSHALL: He did not offer it as an amendment to that motion.

DR. CAMPBELL: I intended to offer it as an amendment to the motion. Is the mover of the original motion in favor of the amendment?

DR. HOSKINS: Dr. Campbell has not stated his amendment.

DR. CAMPBELL: As I understand the motion, it is to accept the recommendation of the executive committee, that is the present executive committee as now constituted, composed of thirteen members from throughout the country to constitute a committee on Journal to organize and establish an efficient publication on the lines of the American Medical Association and to carry it out until other provisions are made for it.

DR. HOSKINS: That is the way I understand it. That the recommendations of the executive committee must either be accepted or rejected and if they are rejected, then we can come back with the motion putting the motion in some other form. That has been the custom of our association for a great number of years.

PRESIDENT MARSHALL: That is my opinion. That you must accept the recommendation of the executive committee or reject it.

DR. HART: Mr. Chairman, I move the report of the executive committee be adopted.

DR. KINSLEY: Is not that the same motion that is before the house now?

PRESIDENT MARSHALL: The motion was already made.

DR. KINSLEY: If that is the ruling, I would like to ask another question. Is it the intention of the executive committee to use the list of the executive committee and officers as presented and published in our program?

DR. HOSKINS: Yes. The publication committee or committee on Journal.

DR. KINSLEY: I say is that committee to be the same as published in our printed program.

DR. LYMAN: As now constituted?

DR. MAYO: As I understand it, Mr. President, it means the executive committee as at present constituted. The question was not discussed particularly in the committee as to that but that is my understanding.

DR. KINSLEY: Mr. President, that being the case, as I recall it, it has been the custom in making the report of the executive committee, that a list of the men constituting that committee, be presented for the information of the association. I do not believe there are many of us here who know who constitutes that committee. Looking over the printed list which appears on the program, I see a number of members listed there who are not present at the meeting and I doubt if they have taken any action with the executive committee. I think it is fair to the organization that we may know who they are.

RR. R. C. MOORE: Mr. President, as a member of the association, I cannot support the recommendations of that committee to continue the present executive committee for the publication committee or committee on Journal because they are too widely separated. I do not believe it is practicable, not that I have a right to say anything against any member of the committee or against their ability, but they are too widely separated. I believe it would not be practicable to conduct a Journal in a proper manner when the men who have charge of the running of it are widely scattered as these men are. I believe as a matter of business, these men should be appointed by the president, for the purpose of running this Journal.

PRESIDENT MARSHALL: I think it would be in order to explain to you who are the present members of this executive committee. I will read them: Dr. Cary, who is chairman of the committee. He is not present. Dr. V. A. Moore has been substituted as chairman in his place. Dr. Lester H. Howard is not present and Dr. Frothingham has been appointed in his place. Dr. Jensen is present. Dr. Dyson is not present and Dr. Stange was elected in his place. Dr. Roberts is present. Dr. S. H. Ward is not present and Dr. Lyman was appointed on the executive committee in his place.

The executive committee as now constituted, consists of the following: Drs. Moore, Frothingham, Jensen, Stange, Lyman, and Roberts, and elected officers of the association. These officers are about to retire.

DR. TYLER: As I understand it, the present motion before the house, provides that the men who are serving at this meeting on the executive committee are to be continued, not those on the present list. It seems to me the association is taking out of the hands of the new president, his inalienable right to appoint committees working under him who are largely responsible to him for their actions. I think the president is entitled to the right to appoint his own committee on publication or Journal, or whatever you call it. He has some rights in the matter.

DR. CAMPBELL: I will now ask if you will entertain an amendment of this motion to adopt the report of the executive committee of this nature, that the reports be referred back to the committee with instructions to change the publication committee, or the committee on Journal to five members appointed by the new president. Will you entertain an amendment of that kind?

PRESIDENT MARSHALL: I will put the proposition to the association and let them decide what they wish to do about it.

DR. HOSKINS: I understand you cannot entertain a motion of that kind. We have either got to reject or approve the recommendation of the executive committee. We must do one thing or the other. If it is not the desire of the members of the association that the present executive committee, as now composed, shall constitute the committee on publication or the committee on Journal. to undertake the work of establishing this Journal, we want to vote against it. If we believe they can best carry out the provision contained in the resolution, then we should approve the recommendation of the committee.

DR. KEANE: It seems to me we are quibbling over some very small details anl yet at the same time this is an important thing. If the association decides to adopt this resolution which provides for the publishing of a Journal, it would appear to me, that the first year would be the most critical year in the history of the publication and the men who have been working on this plan, it appears to me also, are the men who ought to have charge of the first year's work. Some objection was made on account of the fact that they cannot get together. There are three on this executive committee at this association today, who are from the east and two from the eastern part of the middle west. I think that is about as close as you can get members of a committee together and at the same time give the whole country representation on the committee. So that is why I am in favor of the executive committee's report as read.

DR. KINSLEY: Mr. President, I rise to a question of information. Does not this resolution carry with it the present officers of this association on that committee? They are scattered from the Gulf of Mexico to Canada and from the Pacific to the Atlantic.

DR. MAYO: Permit me to state, that the members of the executive committee realize that the actual work of running this Journal has got to be done by two or three men and it is their plan to appoint a sub-committee, so situated and we hope, qualified to get this Journal started, but they thought the association ought to be represented back of this small committee by a much larger committee on publication or Journal, which should be pretty well scattered over the nation. The members of which could be reached by mail and not necessarily be called together, in this way they could advise whoever is carrying out this work. That was the idea of the committee.

PRESIDENT MARSHALL: If there are no other remarks, the question is, whether we will accept or reject the recommendation of the executive committee. Those in favor of accepting the recommendation of the executive committee, in regard to the publishing of a Journal, make it manifest by saying, "aye", those opposed, "no". The "ayes" have it; it is so ordered.

DR. MAYO: Mr. President, the committee also recommends that this organization shall be incorporated as the American Veterinary Medical Association.

DR. FOX: I move that the recommendation of the executive committee, that the association be incorporated, be accepted. Seconded by Dr. Kinsley.

PRESIDENT MARSHALL:—Are you ready for the question?

DR. HOSKINS: Mr. President, I trust that resolution will not prevail or at least that it shall not prevail at this meeting. There are so many things to be said about incorporated bodies. We have gone along very well for fifty years and the few little instances that we have had have been insignificant as far as any trouble this association has had is concerned. We have been a body of men governed entirely by the rules of our adoption. The moment we become an incorporated body we become in every sense a legal body and I know that there are some who feel there may be at some time a possible danger of some one of us being sued for large amounts of damages. While this should not have any weight with us, yet you should remember that the moment we become a legal incorporated body, we are far more readily sued and drawn into litigation than we are as we stand today. If we incorporate, then we exercise and hold our rights and privileges under legal restraint which surely has not solved many of the great difficulties under which such bodies labor and I think the moral forces have done more to solve every public question than any legal entanglement and I sincerely trust that if we are really going to be incorporated, we will have at least a year to think it over before we adopt the provision. Incorporation, in my mind, has not a single thing to commend it. I am a member of several clubs, one of them a great force and a great power in our community, and from the fact that it exerts its influences by moral suasion and moral appeal and moral force, we have kept it from being a legal body that might be sued. To dismiss a man by any failure to live up to what we preach or our code of ethics, or our ideals, we will never accomplish by legal measures. Let us remain simply a moral force, bound together because we have certain ideals and are all interested in carrying them out. Let us not invite the legal entanglements that will follow incorporation as it is impossible to get a national incorporation. We must incorporate under the laws of some state and must be responsible to what may be the laws in that certain state governing corporations and we will also be bound by the future laws which may be made. To my mind, we are going into a mass of difficulties, the nature of which no man can foresee. For more than fifty years we have been operating under the present plan of this association which has met every purpose in dealing with every business proposition which we have had to meet and if some of the members have had to give more of their time, more of their money than others, they should remember they came into this association to do all in their power for the best interests of it and for the profession which has been benefited by the progress of this association.

DR. MAYO: Mr. President, the sentiments we have just heard expressed by Dr. Hoskins, of course, we all approve of, but the establishment of a Journal is a business proposition requiring a definite business organization, and no responsible person will be associated with that business organization unless it

is incorporated. You have got to collect money, and in order to do that, we must incorporate. We cannot do it as individuals of this association. It is an absolute necessity if we are going to publish a Journal, there is no question about that at all. You assume no more legal responsibility than your officers do now and while I have signed a note with others for several thousand dollars, one does not like to do it, nevertheless, I am sure the members of this association, if there were such would rally to your support. Yet, at the same time, aside from the fact of personal risk and personal inconvenience we cannot do business unless this association is incorporated, and that is all there is to it. So far as I am personally concerned, I would be just as loyal and will give my hearty support to anything that may come up as anyone else, but I do not think that I would care to be associated with a business proposition of this kind that was not incorporated.

DR. LYMAN: I want to endorse what Dr. Mayo has just said. I don't believe there is a member of our association that would want to become the editor of this Journal without the incorporation of this association. As Dr. Hoskins has said, we have had an association for some fifty odd years, and have run along very smoothly. Perhaps you don't know all the details. It may have seemed to have run very smoothly to some of you who are not behind the scenes. I personally was sued for ten thousand dollars while a member of your association for actions of the association. I think some of you are familiar with that fact and I paid for the defense of this action out of my own pocket. Why should not this association pay the expenses of the association and not shoulder them upon the individuals themselves? I just simply want to endorse what Dr. Mayo has said, I believe we must be incorporated since we are going to conduct an official Journal.

DR. HOSKINS: Mr. Chairman, I am quite familiar with the case Dr. Lyman refers to. It was an insignificant act of an irresponsible man and amounted to nothing. I have been a trustee of this association for five consecutive years. I never had the slightest question asked about where the money was coming from to meet our obligations. It is a fact that when we went to publish the minutes of last year, we didn't have the money with which to do it and some of us were asked to give a note in order to aid the publisher in carrying out his work, which was given. It was not that he had any doubt but that the association would pay. Any publisher will probably charge up an account for you to give you credit for two or three months before you will be asked for money. This association has a good steady income, it is a very definite matter. Now if we incorporate, our president may be involved in litigation and he may have to answer for anything that is published in the proceedings, and he may have to answer in the courts of Washington, or in the courts of Dakota, or he may have to go down and answer in the courts of Texas. I don't want to put any member of this associatiin in that position. I don't want to see this association brought into the field of litigation by which attorneys would have to be retained in the various portions of the country and a great deal of expense would be laid upon the association. If I thought it was absolutely essential to have an active incorporation to publish this Journal, I would be against publishing it rather than to write litigation

all over the land which this incorporation will cause because your officers will have to respond to every suit and we can be sued then as a whole through your officers, where today, we can only be sued as individuals and those financially responsible will be sued. The expenditure of twenty-five dollars in Connecticut, is a mere drop in the bucket. However, the necessity of giving a note signed by five or six men as endorsers, is a matter of good faith. We have an assured income to pay the bills of the association. If we have to be incorporated to publish a Journal, I say let's not publish a Journal.

DR. STANGE: I fail to see what the objection to incorporating is. Why should we not be incorporated? What is the great objection to doing business as an incorporated organization?

DR. MAYO: Gentlemen, we cannot do business unless we are incorporated. If you have advertising, you have got to have some one with some authority to collect it. You cannot collect a cent of money now for anything, for any purpose, unless you are incorporated, and I want to tell you if you start to publish an official Journal for this organization I seriously question whether you can publish such a Journal unless the officers of this association are personally responsible for any debts that may be incurred. It is just exactly what we had to do in publishing the proceedings last year. You may talk all you please about this matter of courtesy when they say, "Oh, they know this association always pays its debts." That is true. The association has an income but it is also true that the publishers want a note that is negotiable, that they can discount. The publishers have to have money with which to meet their expenses and they must have a negotiable note so when it comes down to that, a business proposition, you are going to find that there is no sentiment back of it all. It is all very well to talk about the sentimental phase of it but this business does not recognize sentiment and you have got to have a legal entity to do this. There is no question about it.

DR. RUTHERFORD: In order to throw a little light on this question, I might say that since Dr. Hoskins has pictured the career of an incorporated body, as being beset with many terrors, I would cite the experience of the Manitoba Veterinary Association which was incorporated over twenty years ago and has had a very smooth, uncheckered career, has never sued or been sued and I do not, for my part, see any such trouble as Dr. Hoskins has pictured. I think it is very desirable that this association should be incorporated so as to facilitate the business which is before us in connection with this Journal.

DR. FOX: As the mover of the adoption of this report, I wish to say, that while I agree with Dr. Hoskins as to the necessity of our having the moral support of our members, I believe that we should not do anything that would detract in any way from the morals of this association, nevertheless, I cannot understand why the incorporation of this association should detract in any way from its moral support or standing, none whatever. I have the privilege of belonging to two or three different organizations which are incorporated and have been incorporated for many years, in fact one of them is our state association, which was composed of only twelve members, or ten, as I remember it and the very first thing they did was to go to the state and take out their incorporation papers. It has now been in existence for twenty-seven years

and they never have had a particle of trouble in any way whatsoever. If we want to obligate ourselves in any way, it is not necessary for us to obligate our officers, or such members of the association as happen to be on the committee. It is not necessary for them to endorse notes and be responsible for our association, to the banks for the indebtedness incurred. Why not make this association an incorporation? Let it stand for its own liabilities. Incorporation would give the association standing and not detract in any way from the moral side or the moral support. I believe if this association is incorporated, it will have just as much moral support and probably more than at present. It could not in any way cause me to depreciate the pride I have in this association, simply because it has been incorporated.

DR. KEANE: We have no legal standing today. What is there to prevent some other veterinary association or other people of other organizations to organize another American Veterinary Medical Association and incorporate it and get legal standing and forbid this organization from retaining its name? I cannot see any objection to its incorporation.

DR. HOSKINS: Mr. Chairman, I don't think that Dr. Fox got my point. I probably did not make it as clear as I should. You incorporate under the laws of Illinois, for instance, or of Delaware, (the place where you will probably get it the cheapest) you will have to be responsible to all of the laws of that state, present and future. The point I wanted to bring out was that we do not attempt to exercise our powers today by any legal rights we might possess. We determine for ourselves what shall be the best thing for the majority of the association, by vote. The day we become a legally incorporated body, we then are responsible to the laws of the state, under which we are incorporated and you must respond in a legal way.

It is a sure thing for a man who may be offended by some statement made here in a paper presented on the floor, in which he may be held up to scorn and ridicule, for him to sue the association. It is the easiest thing in the world for him to institute proceedings against the association and you will find yourselves just as other organizations have found themselves, with suits piled up against you and they will be all over the land. It will be a very easy thing in the case of the Manitoba Veterinary Association where all of the members live within the province but it is a very different problem in the states with an incorporation having members in all of the forty-eight states, each state having its own laws, all different in many respects. The moment the body has a legal existence, that body can be sued and can sue. I hope I will never live to see the day that this association would have, by legal measures to enforce its mandates as decided by the majority of the association from year to year. It loses that great moral force, that we have stood for and it solves but one problem, that of getting credit and I think that is a minor problem. So with all due respect to Dr. Mayo, it is based upon the problem not more than once or twice to be met and quickly met and accepted when it was a momentary question.

DR. MAYO: Mr. President, Dr. Hoskins does not understand it. For instance, I gave a bond to this association from a bonding company for $2,500.00. They said, "Whom are you making it out to? Is this society in-

corporated?'' ''No.'' ''Well,'' they said, ''Make it out in the name of somebody.'' And I made it out to Dr. Marshall. Now, gentlemen, that was all the protection you had. In the case of the treasurer, it was the same thing. He gave a bond made out to some member of the association. He could take the money and go anywhere and you would have no redress. I hope we will be honest, we have been up to the present time but we cannot do business unless we are incorporated and you assume no more responsibility than any individual member does. Dr. Hoskins talks about some member making statements here for which he could be sued individually. What are you going to do about it? It is absolutely necessary that we incorporate. I call for a vote on it.

PRESIDENT MARSHALL: The question is called for. The question is, whether we will accept the recommendation of the executive committee and incorporate the association. Those in favor of incorporating the association as recommended by the committee, make it manifest by saying, ''aye.'' Those opposed, ''no.'' The ''ayes'' have it; it is so ordered.

DR. MAYO: I will state that I have received a telegram from the Ohio State Veterinary Medical Association, stating that they appropriated $100.00 to the Salmon Memorial Fund and asking that certain resolutions be presented to the association. It has been referred to the chairman of the committee on resolutions. I have received a number of letters and telegrams from various members, who are unable to attend, all extending their regrets and wishes for a prosperous and successful meeting.

DR. ELLIS: I think this association has received communications from the Presidents of the State Societies and as they did some very active work with the Salmon Memorial, I think the matter should be presented here.

DR. MAYO: I think it will come up before the committee on resolutions.

I would also report the resolution of the executive committee, that a sub-committee consisting of the president of the committee, Dr. Moore, the president of the association, Dr. Marshall, and myself be appointed to consider the question of acquiring an already established veterinary journal.

DR. HOSKINS: I move that the recommendation be adopted. Seconded by Dr. Kinsley.

PRESIDENT MARSHALL: Gentlemen, you have heard the motion. Any remarks? Will you accept the recommendation of the executive committee, and that a sub-committee of three be appointed as stated by Dr. Mayo, to ascertain the advisability of taking over a Journal that is already established? The executive committee has made this recommendation. Any remarks?

DR. HALTON: I believe that the American Veterinary Medical Association has got enough work to do to take care of the medical and scientific end of the profession and ought not to dabble in a publication, practically a newspaper proposition and I believe the further they go into it the more trouble they will get into. I believe a newspaper or publication should be handled by private men. I am certainly very much opposed to the association dabbling into any Journal whatsoever.

DR. NELSON: Mr. President, I rise for information. I understand that

this other recommendation that we adopted, included all that. That this present executive committee was to establish a Journal. Now it seems to me that if we pass this other resolution, appointing a sub-committee it is going to complicate matters. Is this sub-committee going to report to this meeting or will they report to the big committee, or will they have to wait over for another year? It is simply a matter of information which I want to get.

PRESIDENT MARSHALL: The idea of the appointment of this sub-committee is that the association would be under no obligations at all but the committee would simply ascertain what could be done in the way of procuring some Journal already established and that committee would recommend whatever it thought best to the big committee. The idea of the sub-committee is that it should determine the cost of publishing such a Journal, terms, and so forth. We could then determine whether we would want to establish a new Journal or purchase one already established. This sub-committee, as I understand it, would make a recommendation to the committee on Journal.

DR. KINSLEY: I understood this whole matter was up to the executive committee as provided in the resolution. It seems to me that covers the matter.

DR. FOX: As I understand it, the three members of this sub-committee, are members also of the big committee, and it would seem to me that it does not matter which way we act, that they are all members of the executive committee and if the executive committee feels like selecting them to take charge of this particular part of the work, it is up to them, or if the association feels like putting them in to do this part of the work, it really makes no difference whatever. I want to know whether it is the intention of this sub-committee to report to this meeting or go on for the year and make their report in regard to this Journal at the next meeting, which in my opinion, would be the best to do inasmuch as it would seem rather a large undertaking to look over printing establishments, presses, and so forth and report back here in a few minutes. It seems to me this is rather too big a job for that.

PRESIDENT MARSHALL: At the time this suggestion was made, the resolution we have already adopted had not been approved. I doubt if that sub-committee would have been recommended if we had known you were going to adopt the resolution you have adopted. In my opinion, that committee has authority to do what the sub-committee has asked for and if you have no objections I will just let that suggestion die. I will withdraw it. As no objections have been offered, it is withdrawn. Are there any other recommendations for the executive committee? If not, the next order of business, is the report of the special committee on veterinary college investigation. You will remember perhaps, that at the second session, the report of the committee on intelligence and education was presented but the discussion was postponed until the report for this other committee should be accepted, so we will now call for the report of the special committee on veterinary college investigation and discuss the two reports together.

The special committee on college investigation is composed of the following: Chairman, Dr. M. H. Reynolds, George W. Dunphy, and P. H. Browning. Dr. Dunphy, I believe, is the only member of that committee present. Is Dr. Dunphy in the room?

DR. DUNPHY: Mr. President, in the absence of Dr. Reynolds, I might say that this report was turned over to myself and Dr. Browning. We have gone over the report carefully and there are some matters in the report, we have decided to leave to the association and executive committee.

I would ask the secretary as a favor to me to read this report. I am so hoarse this morning I do not believe I could make you understand after I have read for a few minutes. If there are any remarks or questions afterwards, I will be pleased to answer them to the best of my ability, but with my throat in the condition in which it is, I must conserve my voice.

Secretary Mayo then read the report of the special committee on college investigation for the years 1913 and 1915, as follows:

REPORT OF COLLEGE COMMITTE FOR YEARS 1913–15*

We would first of all express our appreciation of the uniform courtesy shown us by the institutions visited in the course of our work. Not only have responsible officers of several institutions met us in good spirit, given us all desired information and placed their records freely before us, but individual members of faculties with very rare exceptions have been equally courteous and helpful.

GENERAL METHODS

PLAN OF WORK:—When visiting an institution for this purpose we have endeavored to put ourselves first into the position and attitude of the new student or the general public visiting such an institution for the first time and then we have endeavored also to get a general impression of the institution from a professional standpoint, estimating the institution in a very general way as to the fitness for its purpose.

We have had the advantage this year for the first time of a standard curriculum. Last year our by-laws were greatly improved by the addition of certain regulations taken from B. A. I. circular 150. This has been a great aid to your committee in its work of inspecting and measuring institutions. This association should still understand however that it is easily possible for a comparatively inferior institution to comply with the letter of the law so far as our by-laws are concerned.

FINDINGS

GENERAL SURROUNDINGS:—Reporting now for the general surroundings of veterinary schools, social, moral, etc., we must report

*We regret very much that, due to oversight, Dr. D. M. Campbell of Chicago was not given proper credit in this report for a very considerable amount of active assistance inspecting with the chairman the following institutions: Cincinnati Veterinary College, Grand Rapids Veterinary College, Indiana Veterinary College, Terre Haute Veterinary College.

a very great diversity still existing in American veterinary colleges. Some of our colleges measure up exceedingly well in these respects, just as well as any other schools of technical education. Some of our accepted schools are just fair in these general aspects, some are in very undesirable neighborhoods or have other conditions connected directly with the school which makes the ethical conditions undesirable.

In some of our veterinary colleges the class rooms, laboratories and general surroundings are all that could be reasonably desired in appearance. Others are extremely dreary, uninspiring or even seriously objectionable.

We feel quite justified in calling the attention of our profession to this again, on the ground that it is a matter of great importance to the profession.

The general situation with our veterinary colleges has in recent years improved materially in these respects. Quite a number of our veterinary faculties which heretofore were apparently indifferent or at least had done nothing, possibly because the matter had not been brought to their attention and who apparently felt no responsibility concerning students' moral and social welfare are now conceding they have been wrong and either have important changes under way or have made definite plans for improvement.

AMOUNT OF WORK AND DISTRIBUTION OF SUBJECTS:—We find that the amount of instruction per individual teacher and distribution of subjects is now very satisfactory with only a few exceptions. Formerly we had a number of schools where a few men on each faculty were doing practically all of the work with a lot of other names carried on the faculty list chiefly for advertising purposes. This condition has largely disappeared.

We have this year criticised excessive assignments to only a few men out of the large number of faculty men concerned in the institutions visited.

Careful examination shows that a number of recognized schools are not complying with regulations XI, XII and XIII of article VIII, section 2, relating to the number and qualification of veterinarians for specified major subjects. According to the best information your committee could get from inspection, catalogs and correspondence it appears that a majority of the schools have been operating during the college year 1914-15 in violation of one or

more of these three regulations concerning faculty members and major subjects—usually XI and XIII.[1]

FACULTY FITNESS FOR SUBJECTS:—Concerning fitness of faculty men for their subjects and work in general, we would report that there are a few men on veterinary college faculties inspected this year who have no special qualification for their subjects, usually laboratory subjects, where thorough special training is desirable. These have usually been earnest and otherwise capable teachers who could unquestionably give satisfactory service if transferred to some other subject. In some cases we have recommended, in the private report prepared for transmittal to each individual institution, that these men should avail themselves of special courses in leading universities where they can study with masters of their subjects and have every needed facility for doing advanced work.

It is inevitable that in any line of professional teaching with so many faculty men involved there must be a few men who could not be considered otherwise than unsatisfactory for one reason or another. Faculty conditions in this respect are not yet ideal but there is a steady improvement.

MATRICULATION REQUIREMENTS:—On account of changes in our matriculation requirements beginning with the school year 1914-15 we have given unusual attention this year to this phase of our committee work. Considering for each institution general condition of examinations, questions, markings, records of acceptances in lieu of examination, and number of new students with one or more years of high school.

Concerning matriculation requirements we find that there has been a constant improvement in meeting the spirit of A. V. M. A. requirements so far as common school branches are concerned. For several institutions, we have criticised the use of "letter writing" and "copying from plain copy" to bring up low averages in other subjects. In several cases we criticised the sample questions sent out to prospective matriculants because they are too similar to questions actually asked the same students later on in matriculation examination. In a very few cases only did your committee think the questions on common school subjects were too easy to comply with the spirit of the association requirements for these subjects. In state institutions the matriculation work is usually

(1) Exact information not given. Reported to the committee as violating this section.

entirely outside of the veterinary faculty and in charge of a general faculty committee or some officer of the institution. Most of the other schools appear to have used a common and agreed upon set of questions. The same sets of questions were found at different schools in widely separated portions of the country. Apparently several sets have been prepared and each institution selects from these.

In a few cases schools have prepared their own questions or have had them prepared by high school men and these have usually been more satisfactory than the common sets.

Matriculation records are being very much better kept and are much more readily available than formerly.

Concerning this matter of sample questions, we submit here the following list of sample questions to prospective matriculants, and questions actually used on examination. In our opinion, the custom of sending out sample questions should be either discontinued or they must be quite different from those actually used. Sample questions should only indicate the difficulty of the examination and give no intimation of the specific topic or problem:

Sample Question: "For what are each of the following men noted: Thomas A. Edison; Abraham Lincoln; General Custer; Admiral Dewey?"

Question used for matriculation: (1) "Who was President of the United States during the Civil War?" (2) "During what war and at what place did Admiral Dewey gain fame?"

Sample Question: "Name the principal rivers emptying directly into the Mississippi River."

Question used for matriculation: "Name the longest river in the United States. Into what body of water does it empty?"

Sample Question: "From 39,616,787 subtract 7,935,662 and divide the remainder by 149."

Question used for matriculation: "Subtract 86,347 from 94,231 and divide the remainder by 16."

Sample Questions "Express the following in decimal fractions: ⅜, ¼, 8/10, 2/5, ½."

Question used for matriculation: The same excepting slightly different common fractions were used.

Concerning our one year high school or equivalent requirements, we have assumed that the various colleges have taken for granted that their matriculation examination was equivalent to the

one year of high-school work, but your committee was of the opinion that in many instances their examination questions did not come up to this requirement.

As this condition seems to be so general, the committee have deemed it advisable to over-look this technicality and have called the attention of such schools to this matter in our private letter of criticism, believing that a minor matter of this kind can be regulated in that way without the chance of disqualifying graduates of such schools for membership in this association, which would be almost unfair considering the short time that the regulation has been in force and that there was no meeting of the association in 1914.

Most of the schools which your committee report as failing in this requirement appear to have adopted as one year high school equivalent, a uniform list of 32 sets of questions on affairs of every day life, such as dairying, poultry raising, retail meat trade, horse training, horse salesmanship, general merchandising, horseshoeing, barbering, etc.

The following are selected as fair samples of these questions and are here submitted for publication as a portion of this report, taking uniformly the first question from each set at random:

Farm Crop Raising: What disposition should be made of farmyard manure? Give method of disposition.

Meat Industry: How are swine killed and dressed for food?

Horse Training: What are the essential qualifications for a successful horse trainer?

Horse Salesman: What qualifications should a good horse salesman possess?

General Merchandising: What commodities of a general grocery stock should be kept in a refrigerator?

Horse Feeding and Breeding: Describe your ideal type of horse for general farm work, (color, weight, breed, etc.)

Barber: Describe generally what you think should be the qualifications of a barber so as to insure success in business.

Stock Raising: What is the most important consideration in selecting a range?

Milk Distribution: Is it necessary to keep milk cool until consumed? Why?

Cheese Making: What is cheese?

Farm Mechanics: How high would you make a wire fence for confining hogs?

Southern Farming: What type of mule is best adapted to cotton farming?

In the opinion of our committee this cannot be considered as a reasonable compliance with the matriculation requirements calling for one year of high school or an equivalent.

The following is a sample high school course obtained in one of the cities where there is operating one of the schools here listed as failing to comply with this requirement. The three courses which appear best adapted for a veterinarian's foundational education "Classical", "Modern" and "Scientific" call for first year the following:

Classical course calls for English, Latin, algebra and either ancient history or botany or physiography.

The modern course calls for English, algebra, ancient history and either German 1, or botany or physiography.

The scientific course calls for English, Latin, algebra and either physiology with civil government or botany or physiography.

Records of acceptance in lieu of matriculation examinations, i. e. aceptance of credits from other institutions, principally high schools have in general been very satisfactory. We have found an occasional case that looked questionable at first, but more careful examination has shown reasonable compliance.

Concerning improvement in general appearance, personal and general quality of student bodies, especially matriculants there can be no question as to a steady and very satisfactory improvement. There has been a marked improvement even within the past few years.

Institutions in different parts of the country vary greatly in respect to the number of students who have had one year or more of high school. In some of our private colleges the proportion of students who have had such advantages has been surprising, especially when we consider that actual high school attendance had not been a requirement. In other institutions perhaps not widely distant, the proportion of students who have had high school work is very small, but in general there is a steady and rather rapid increase.

GRADUATION REQUIREMENTS:—We have no criticisms to offer concerning graduation requirements or customs so long as present

methods must continue under which each faculty conducts its own final examination. We feel that this is reasonably well done and with exceedingly rare exceptions in good faith. Undesirable students are now usually dropped before reaching their senior year.

RESULTS OF PREVIOUS CRITICISMS:—A careful comparison of college committee criticisms and suggestions as they appear in our supplementary report for 1912-13 with the criticisms and suggestions for the same institutions as they appear in our present supplementary report indicates that: criticisms concerning building conditions have been generally complied with; that criticised laboratories have been greatly improved; that lack of library facilities has been met in only a few cases; that criticisms concerning responsibility for student social and moral welfare was acknowledged this year for the first time in several institutions which we hope will have actual plans under way for the next college year. Quite a number of schools are still completely ignoring this responsibility.

Criticisms concerning matriculation methods have been very generally met especially as to keeping of good records in available condition.

Criticisms concerning faculty, e. g. use of men without special training for subjects which plainly require such training have not been well complied with in the few cases where such criticisms have been made. There should be either rearrangement of the faculty under such conditions or such men should avail themselves of opportunity for summer course work at some of our leading universities.

GENERAL STATEMENT:—Making now a general summary and being quite frank rather than complimentary, we would report that some of our veterinary schools compare in all respects very favorably with other professional schools. On the other hand, there are a serious number of our recognized schools not only below, but very far below technical schools for other lines of professional work. As a profession, we will make much more rapid progress if we are willing to open our eyes and face some of these disagreeable truths frankly. It would be much easier for your committee to express complimentary generalities in this connection, but we feel that these would do no harm by blinding us to serious faults and important needs. When we draw this general conclusion, we are considering buildings, equipment, libraries,

museum, laboratories, spirit of investigation and research, college atmosphere, faculty men as to technical training, general efficiency of class room and laboratory work, matriculation requirements, length of course, etc.

Considering all these things honestly, it appears only too apparent that our general level is not yet up to the general level of similar colleges for other lines of professional and technical work—not a pleasing thing to say; but a wholesome thing to know if true.

Please bear in mind we are speaking now of a general level and not of institutions that must be regarded as exceptional.

ARKANSAS VETERINARY COLLEGE:—This being a new institution which has recently applied for recognition, it is deemed advisable to submit a special report concerning it.

This school was visited on March 15, 1915. Briefly summarized we find: first, that this school has been operating in violation of sections 2 and 3, article VIII relating to matriculation requirements and faculty eligibility for major subjects. This school has been in operation only two years. Two classes are in attendance. In addition to violation of sections 2 and 3, article VIII this school is considered as seriously lacking in building, equipment, laboratory facilities and faculty.

Two members of the faculty are teaching five of the specified major subjects, the sixth is taught by an M.D. There are of course several other members of the faculty other than those on the major subjects specifically mentionel in our by-laws for which there are special requirements.

On account of failure to conform to by-law requirements and inadequacies already mentioned, your committee feels obliged to recommend against recognition for the two years 1913-15, the time in which this school has been in operation. This of course leaves the way open for future recognition when satisfactory improvements have been made.

ONTARIO VETERINARY COLLEGE. *Special Report*:—On account of the refusal by its management to submit to inspection, this institution was not listed by the association in 1913 and, of course, no report was made and no association action was taken in 1914 on account of failure to hold association meeting.

Early in 1914 this association was approached indirectly through letter from the Ontario Minister of Agriculture, indicat-

ing a willingness for inspection on the part of this association. The matter was referred to the chairman of this committee and by him to President Marshall for instruction with the result that two representatives of our committee visited this institution in April, 1914.

As members of our profession must be generally aware, the Ontario Veterinary College is now a part of the university of Toronto under government control.

We find this institution now equipped with a new and magnificent building, class-room, laboratory and other facilities for a splendidly improved work. The committee in its private report for this institution makes a number of suggestions which there is no good reason to include here.

This institution has been hampered during the year by the war, in which Canada has been seriously concerned. This has interfered especially with clinic and certain lines of class-room work and some of the major subjects. Under the circumstances everyone concerned will, undoubtedly, be more than willing to make all allowances.

There appears to be a marked tendency on the part of this school to constitute her faculty very largely from her own alumni. Eight out of the nine veterinarians being Ontario Veterinary College graduates, but the Ontario Veterinary College is not by any means alone in this tendency. Several of our most prominent schools on this side of the line show the same condition in their faculty lists.

This school, like a number of American schools, has been operated (technically speaking) in violation of section 2, article VII, by-laws 1913.

There is a question involved here that the committee believes would be wiser to refer to the association or executive committee, or both, in regard to the faculty of this college. The Dean of the institution contends that the Ontario Veterinary College, as now constituted, is a distinct school from the old Ontario Veterinary College (Ltd.), having been taken over by the Ontario government, rebuilt and reorganized as a part of the university of Toronto.

The committee were undecided in regard to this interpretation of the case and consequently feel that, in justice to all concerned, this should be referred to the association or the executive committee to decide.

Except for this, your committee would recommend this institution for restoration to recognition. The Ontario Veterinary College is now, undoubtedly, entitled to the same footing as other schools previously listed in this report, as the majority of them are now found in technical violation of article VIII which relates to faculty requirements for major subjects and one year high school for matriculation.

San Francisco Veterinary College. *Special Report*:—On account of the fact that our main inspection in the San Francisco Veterinary College was not made during the same college year as for the other colleges here reported and on account of the fact that in the past informal charges have been made against the San Francisco school and its management, and an expressed desire on the part of responsible officers of our association, members of the executive committee and older members of the association for official information, it has been deemed advisable to include here a special report on this institution.

This institution was visited by two members of the committee and the following report is based on this inspection:

Additional details of criticisms and some minor criticisms not mentioned here are included in our supplementary report for the management of the institution.

The general surroundings of this school, its class rooms, laboratory facilities and equipment, social atmosphere, etc., are fully as good as a number of others already recognized.

The school is located in a fairly good neighborhood.

The amount of instruction given and distribution per individual teachers was satisfactory with the exception that Dr. O'Rourke, in charge of three important subjects, surgery, obstetrics and therapeutics in addition to a private practice to maintain, appeared to be overloaded.

An important position on the faculty (physiology) had not been filled at the time of inspection when work should have been under way and there had been no provision made for carrying this work.

Matriculation was conducted in about the usual way for similar schools. Markings were satisfactory as were also records of acceptances, from other institutions with the exception of certain minor criticisms already made to the management.

Concerning compliance with our by-law requirements, regula-

tions XI to XIII, section 2, article VIII relating to the teaching of specified major subjects we find that this school in common with quite a number of other institutions is failing to comply with these requirements. Note that this last statement is for the college year 1914-15, this being the first year for which these requirements have been in force. The violation here is of regulations XI and XIII, there being at most but four veterinarians in service eligible for the specified major subjects, if our information is correct.

Concerning section 3, article VIII, by-laws 1913 relating to one year high school or equivalent as a matriculation condition, we would report that this institution in common with others has operated during the college year 1914-15 in violation of this regulation also.

This school is considered by the committee as subject to reasonable criticism on account of too much shifting in the faculty. The building in general, class rooms, laboratories, etc. were not in a condition creditable to a professional college, certainly not inspiring toward high professional ideals, being untidy and in disorder.

The surgical clinic room was in bad condition and it was difficult for your committee to see how clean, creditable surgery could be taught in such an untidy room. But we would warn against a too hasty condemnation on this point as several other recognized institution have been found during the past two years in fully as bad condition.

Concerning questions that have been raised as to facts of incorporation ownership of institution, personal questions relating to faculty members, etc., it appears to your committee that many of these questions are not the concern of either this committee or the association except as they bear upon proper organization and management in relation to the student's welfare or the welfare of the profession as a whole.

Investigation showed satisfactorily that this institution has been properly chartered as an educational institution, not as a business institution.

One of us (Reynolds) saw a certified copy of Articles of Incorporation signed by the secretary of the state, dated February 12, 1912, this being the second set of Articles of Incorporation. A certified copy of the first charter was also submitted to the chairman of this committee. A deputy recorder stated in our presence at the court house that they had no records of this kind dating prior to the earthquake.

REORGANIZATION OF COMMITTEE WORK:—We would again call attention to the overlapping function of the committee on college investigation and the committee on intelligence and education and would again recommend the adoption of some plan similar to that of the American Medical Association, a fairly stable council involving the fusion of these two committees. We propose the following by-law amendment:

Substitute for the fifth line of article VII the following: "Committee on veterinary education, three members," term of office (3) three years, one membership expiring each year.

Substitute for section 2 the following:—"It shall be the duty of the committee on veterinary education to investigate the work of the American veterinary colleges and to report to the association such general findings, suggestions, and criticisms concerning the same as it may deem advisable."

"It shall also be the duty of this committee to annually recommend to the association a list of veterinary colleges for recognition by the association with reference to eligibility to membership of their graduates.

"It shall also be the duty of this committee to keep in touch with the general progress of education in the veterinary, and allied professions and make such report from time to time as it may deem advisable."

LIBRARY AND MUSEUM:—We recommend that this association shall by official action take a position to the effect that adequate museum and library facilities shall be considered as a requirement of an acceptable veterinary college. Several schools have made creditable starts in this direction during the period here reported, but there is still a very general lack in this respect. We propose the following resolution:

"Resolved that it be expressed as the sense of this association that adequate museum and library and suitable reading room facilities should be considered as among the essentials of a modern well equipped veterinary college, and that at an early date our by-laws shall be changed accordingly."

PLAN OF COMMITTEE REPORT:—It is further recommended by your committee that the general plan of submitting this committee report in two sections, one for reading and publication, the other a supplementary report consisting of criticisms and suggestions prepared by the committee for transmittal by our association secretary to the college concerned, be approved and continued.

(To be continued)

FROM THE OFFICE OF THE SECRETARY OF THE A. V. M. A.

RESIDENT STATE SECRETARIES FOR 1915–1916

Alabama.....W. W. Webb, Auburn.
Arizona.....J. C. Norton, Fleming Block, Phoenix.
Arkansas.....R. M. Gow, State Veterinarian, Old State House, Little Rock.
California.....J. F. McKenna, 616 Eye St., Fresno.
Colorado.....I. E. Newsom, Division of Veterinary Science, Colo. State College, Ft. Collins.
Connecticut.....A. T. Gilyard, Waterbury
Deleware.....H. P. Eves, 301 West 18th St., Wilmington*
Dist. of Colum.....H. S. Gamble, 1329 Gallatin St., Washington
Florida.....Fred W. Porter, 1113 Florida Ave., Tampa
Georgia.....W. M. Burson, State College of Agriculture, Athens
Hawaii.....V. A. Norgaard, Territorial Veterinarian, Honolulu
Idaho.....J. R. Fuller, Weiser
Illinois.....L. A. Merillat, 1827 South Wabash Ave., Chicago
Indiana.....T. A. Sigler, Greencastle
Iowa.....H. C. Simpson, Denison
Kansas.....J. H. Burt, Manhattan
Kentucky.....Robert Graham, Agr. Expt. Station, Lexington
Louisiana.....W. H. Dalrymple, Baton Rouge*
Maine.....Henry B. Westcott, 1008 Congress St., Portland
Maryland.....John H. Engel, 1141 Hartford Ave., Baltimore*
Massachusetts...Edward A. Cahill. Dept. of Animal Industry, State House, Boston
Michigan.....W. Austin Ewalt, Mt. Clemens
Minnesota...H. Preston Hoskins, University Farm, Division of Vet. Science, St. Paul
Mississippi.....O. M. Norton, Greenville
Missouri.....C. D. Folse, 1336 East 15th St., Kansas City
Montana.....F. S. Gray, Great Falls
Nebraska.....C. J. Norden, Nebraska City
Nevada..W. B. Mack, Dept, of Vet. Science, Univ. of Nevada, Reno
New Hampshire.....A. C. Farmer, Berlin*
New Jersey.....E. T. Davison, Athenia
New Mexico.....G. A. Lipp, Roswell

New York...C. P. Fitch, New York State Veterinary College, Ithaca
North Carolina.....B. F. Kaupp, Raleigh*
North Dakota.....C. H. Babcock, New Rockford*
Ohio.....S. Sisson, Div. of Veterinary Medicine, Ohio State University, Columbus
Oklahoma.....Joseph E. Nance, Anadarko*
Oregon.....W. Dean Wright, 1227 Missouri Ave., Portland
Pennsylvania.....E. H. Yonker, 2344 North 18th St., Philadelphia
Philippines.....William Boynton, Bureau of Agriculture, Manila
Porto Rico.....Carlos Ortiz, 26 Villa St., Ponce*
Rhode Island.....J. S. Pollard, 183 Harrison St., Providence
South Carolina.....B. K. McInnes, Charleston
South Dakota.....S. W. Allen, Watertown
Tennessee.....No one appointed as yet, M. Jacob, State Veterinarian, Nashville, acting
Texas.....A. A. Foster, Marshall
Utah.....John Ernst, Jr., 125 E. 4 South St., Salt Lake City*
Vermont....F. H. Rich, Vermont Agricultural Experiment Station, Burlington
Virginia.....William G. Chrisman, Blacksburg*
Washington.....Carl Cozier, Bellingham
West Virginia.....E. Layne, Huntington
Wisconsin.....W. A. Wolcott, Madison
Wyoming.....Hugh R. Millard, 2507 Central Ave., Cheyenne

**These men have not yet filed acceptance of appointment.*

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RESIDENT PROVINCIAL SECRETARIES

Canada

Alberta.....F. A. McCord, 215 Queen's Ave., Edmonton
British Columbia....J. G. Jervis, 3694 Victoria Drive, Vancouver
Manitoba.....William Hilton, 334 Elgin Ave., Winnipeg*
New Brunswick.....D. McCuaig, McAdam Junction
Nova Scotia.....George Townsend, New Glasgow
Ontario.....George Hilton, Department of Agriculture, Ottawa
Prince Edward Isle.....W. H. Pethick, Charlottetown
Quebec.....M. C. Baker, 194 Milton St., Montreal*
Saskatchewan.....H. L. Dixon, Maple Creek*

**These men have not yet filed acceptance of appointment.*

LIST OF COLLEGES RECOGNIZED BY THE A. V. M. A.

Alabama Polytechnic Institute, College of Veterinary Medicine.
Chicago Veterinary College.
Cincinnati Veterinary College.
Colorado State College, Division of Veterinary Medicine.
George Washington University, College of Veterinary Medicine.
Grand Rapids Veterinary College.
Indiana Veterinary College.
Iowa State College, Division of Veterinary Medicine.
Kansas City Veterinary College.
Kansas State Agricultural College, Veterinary Department.
McKillip Veterinary College.
Michigan Agricultural College, Division of Veterinary Medicine.
New York American Veterinary College.
New York State Veterinary College.
Ohio State University, College of Veterinary Medicine.
Ontario Veterinary College, Toronto.
St. Joseph Veterinary College.
San Francisco Veterinary College.
State College of Washington, Veterinary Department.
Terre Haute Veterinary College.
United States College of Veterinary Surgeons.
University of Pennsylvania, School of Veterinary Medicine.

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On account of numerous inquiries coming into the secretary's office, the following information concerning the A.V.M.A. dues and the privileges of members with respect to the *Journal* has been prepared:

Dues are payable in advance beginning on the first day of the annual convention. On receipt of the dues, the secretary issues the membership card for the current year. Although in 1914 no convention was held dues for that year were collected in the fall of 1914. Members who paid their dues in advance at the Oakland convention received 1915 membership cards. Members who have delayed paying their dues and pay them now will of course receive only the 1915 membership card. The 1916 dues are not payable until August 22, 1916 and bills for such dues will not be sent out until about that time. However, any member who may desire his 1916 card now may receive it at once by paying his dues in advance.

At the Oakland meeting the association voted to increase the annual dues to five dollars. This is a change in section 2 of article

X of the by-laws and goes into effect August 22, 1916. Accordingly, applications for reinstatement must now be accompanied by eleven dollars, to cover the six dollars obligated at the time of suspension and one year's dues in advance. Since applicants for membership must pay one year's dues in advance, this action of the association in increasing the dues has also necessitated a modification of section 1 of article VIII, increasing the sum which must accompany applications to ten dollars. Applicants for membership who have paid their subscription to the *Journal* in advance since October, 1915 may have this credited as a part of their membership fee by writing to the Editor, Dr. P. A. Fish, Ithaca, N. Y. and asking him to notify the secretary. Such applicants need remit only seven dollars.

The *Journal* of the American Veterinary Medical Association, formerly the American Veterinary *Review*, comes free to every member who pays his dues in advance. The United States Post Office Department requires the secretary or editor to secure written consent from each member to whom the *Journal* is sent that two dollars of his dues be used to help defray the expenses of the *Journal*. Accordingly, coupons for this purpose have been attached to the printed application blanks and statements of dues sent out from the secretary's office.

According to the constitution and by-laws, members remain in good standing until they are eighteen months in arrears. However, in order to comply with the Post Office regulations, only those members who keep their dues paid up to within the current year may receive the *Journal* without other payment than their dues. The price of the *Journal* to all others, whether members or not, is three dollars a year. Any one can secure the *Journal* at this price.

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SOCIETY MEETINGS

Wisconsin Veterinary Medical Association

The Wisconsin Veterinary Medical Association held its annual meeting at the State Capitol, Madison, Wis., January 18, 19 and 20, 1916.

The unusually large attendance, and the great interest manifested, was conclusive evidence of the fact that the Wisconsin Veterinary Medical Association is a real live organization.

We had the pleasure of having Dr. J. V. Lacroix of Kansas City with us who gave a very interesting talk on "The Surgery of Fistulous Withers," which was followed by a demonstration of same at the clinic the next day.

We were also very fortunate in securing Dr. H. Preston Hoskins of Minn. as one of the speakers. He spoke on "Some Phases of the Use of Serum in Controlling Hog Cholera." We were fully convinced that there was still much to learn pertaining to this broad subject.

The dinner session, attended by 150 guests, was held in the brown room of the Park Hotel, January 19, and proved a joyous occasion, Dr. L. A. Wright acting as toastmaster. Brief speeches followed the banquet, directed by the toastmaster, in which the following took part: C. P. Norgard, Head of the State Board of Agriculture; S. A. Baird, President of the State Breeders' Association; A. Hopkins, Secretary of the State Breeders' Association; Dr. Joseph Hughes, Chicago; Dr. J. V. Lacroix, Kansas City; Dr. H. P. Hoskins of the University of Minnesota; and Dr. O. H. Eliason, State Veterinarian of Wisconsin. All made special pleas for co-operation between the veterinary profession and the live stock breeders.

Dr. A. S. Alexander, Professor of Animal Husbandry of the University of Wisconsin, proved his ability as an instructor and entertainer when he gave his favorite talk on "Rural Life in Scotland", illustrated by stereopticon views, this being the real "after dinner mint" of the occasion.

After two days of strenuous work in the convention hall, the third and last day was devoted to clinical work at Dr. J. P. West's Infirmary, in charge of Drs. Lacroix, Heer, Ferguson and their worthy assistants.

The following literary program, in conjunction with several very interesting committee reports, was carried out very successfully:

Use and Limitation of the Tuberculin Test.....Dr. C. M. Crane
Tuberculosis Eradication.....Dr. J. P. West
State Inspection.....Dr. O. H. Eliason
Establishment of Inspected Herds.....Dr. J. F. Roub
Avian Tuberculosis.....Dr. B. A. Beach
The Dog as a Carrier of Parasites and Disease....Dr. H. E. Horel
The Effect of Pituitary Gland Extract on Milk Secretion in the Cow.....Dr. F. B. Hadley
Some Phases of the use of Serum in Controlling Hog Cholera .....Dr. H. P. Hoskins
Necrobacillosis .....Dr. G. A. Gettelman

Mastitis ..... Dr. D. E. Murphy
Hydrocele in a Yearling Bull ..... Dr. R. S. Heer
Stricture of the Esophagus ..... Dr. L. A. Wright
Fistulous Withers ..... Dr. J. V. Lacroix
Some Specific Substances which Influence Reproduction ..... Prof. E. B. Hart
Hemorrhagic Septicemia ..... Dr. L. J. O'Reilley
Acute Hemorrhagic Enteritis ..... Dr. W. R. Swan
Forage Poisoning in Cattle ..... Dr. J. F. Roub
Vaginal Polypus ..... Dr. V. S. Larson
Pneumonia in Cattle ..... Dr. R. E. Schuster

The following officers were elected and installed for the ensuing year: Dr. L. J. O'Reilley, Merrill, President; Dr. Herbert Lothe, Sharon, Vice-President; Dr. W. A. Wolcott, Madison, Secretary; Dr. J. F. Roub, Monroe, Treasurer.

The meeting was voted an entire success and adjourned, to meet at Menomonie, Wis., next July, on invitation of Dr. J. D. Lee.

W. A. WOLCOTT, Secretary.

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KANSAS VETERINARY MEDICAL ASSOCIATION

The twelfth annual meeting of the K. V. M. A. was held in the City Building, Kansas City, Kansas, January 5–6, 1916. It was one of the best meetings ever held by the association and interest did not lag from start to finish. In addition to interesting papers and talks by the members, the association was very fortunate in having Dr. A. Eichhorn of the B. A. I., Washington, and Dr. H. Palmer of H. K. Mulford Co. to take part in the program.

Dr. Eichhorn's paper "The Treatment of Diseases with Biological Products" was an excellent paper and created much interest and discussion. The author informed the secretary of the association that the paper will appear in the veterinary publications in the near future, and the association can assure the veterinary profession that a treat is in store for it.

Dr. Palmer gave an illustrated talk on the "Manufacture of Biological Products."

Dr. L. W. Goss, Pathologist K. S. A. C. and member of the as association, gave an interesting illustrated talk on the "Outbreak of Foot-and-Mouth Disease in Kansas."

Dr. J. W. Guilfoil was elected president for the coming year; the present secretary was re-elected.

Fifteen new members joined the association. The next meeting will be held at Wichita, January 2–3, 1917.

J. H. BURT, Sec'y-Treas.

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VIRGINIA STATE VETERINARY MEDICAL ASSOCIATION

The meeting of the Virginia State Veterinary Medical Association convened at Richmond, January 13 and 14. We had the best meeting the association has ever experienced. There were sixty per cent (60%) of the membership present. Our program was one of the best ever rendered. The papers and addresses were of the highest type.

Dr. Horace Hoskins of Philadelphia gave a very interesting talk in which he eulogized the life of Dr. D. E. Salmon, and outlined to our association the memorial fund which was responded to by every member of the association present.

Dr. C. H. Hayes, a specialist on hog cholera, in charge of the extension assigned to the state by the B. A. I., gave a splendid talk on the preparation and administration of hog cholera serum, accompanied by stereopticon views.

Dr. Henry Marshall of the B. A. I. packing house work at Richmond gave a splendid paper on White Scours.

Dr. S. C. Neff of Staunton, Va., gave a very interesting and instructive paper on septicemia, as the result of a kick.

The banquet, which was served by Mr. James Disney, manager of the Murphy Hotel, was a regular seven course Virginia dinner. There were eighty covers. The guests of honor were Gov. Stuart, ex-Gov. Mann, J. L. Houston, speaker of the house, and a number of senators and representatives, Dr. Henry Marshall of Richmond, Dr. C. H. Hayes of Burkeville, Va., and Dr. W. Horace Hoskins.

Dr. Ferneyhough, chairman of the committee, presided as toastmaster. Those responding to toasts were Gov. Stuart, ex-Gov. Mann, Hon. Westmoreland Davis, Hon. J. L. Houston, speaker of the house, Col. Leedy of the senate, Representatives Grasty and Willis, and Dr. W. Horace Hoskins.

The officers for the ensuing year are: Dr. H. H. Adair of Bristol, President; 1st Vice-President, Dr. D. V. Glover of Lexington; 2nd Vice-President, Dr. D. E. Buckingham of Washington, D. S.; Sec'y-Treas., Dr. W. B. Chrisman of Blacksburg.

The time and place of the next meeting is Ocean View, July 13 and 14, 1916. W. G. CHRISMAN, Sec'y-Treas.

Florida Veterinary Medical Association

The second annual meeting of the Florida Veterinary Medical Association was held February 7 in the State Board of Health Laboratory with a representative attendance of officers and members. The only officer absent was Dr. F. H. Armstrong of Pensacola, vice-president. Several prominent Department of Agriculture attaches were present and addressed the convention.

Officers were elected for the ensuing year, the former board of officers being re-elected. They are: President, Dr. C. F. Dawson, Jacksonville; Vice-President, Dr. F. H. Armstrong, Pensacola; Secretary-Treasurer, Dr. Fred W. Porter, Tampa. The following were elected to honorary membership in the association: Dr. Nighbert and Dr. Logan of the United States Department of Agriculture and Prof. C. H. Willoughby of the University of Florida.

The following members attended the convention: Dr. Dawson, Dr. W. A. Munsell, Greene Cove Springs; Dr. W. J. Tanner, St. Petersburg; Dr. Fred W. Porter, Tampa; Dr. W. O. Kemp, Key West; Dr. W. P. Link, Tampa, and Dr. A. Dolan, Sanford.

F. W. Porter, Secretary.

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Oklahoma Graduate Veterinary Medical Association

The semi-annual meeting of the Oklahoma Graduate Veterinary Medical Association was held at Oklahoma City, January 18 and 19, 1916. This was a very successful meeting as harmony prevailed. There was a large attendance and some instructive papers and addresses were given; also some interesting discussions upon various subjects were held.

Among those giving addresses and papers were: Dr. V. W. Knowles of the B. A. I. in an instructive address on vaccination and sanitation in eradication of hog cholera;

Dr. J. G. Eagle gave an addres on the serum treatment of hog cholera;

Dr. E. V. Robnett, State Veterinarian, presented a paper on hemorrhagic septicemia of cattle;

Dr. D. W. Gerber read a paper on influenza of horses in its various forms;

Dr. C. R. Walters gave a paper on the accuracy of the intradermal tuberculin test;

Dr. C. E. Steele told of experiences on his recent trip to Europe with a ship load of mules for the English Government;

Dr. J. E. Nance described in an interesting manner his experiences in the Philippine Islands as a veterinarian in the service of the B. A. I.;

Dr. J. S. Grove, inspector in charge of the B. A. I. at Oklahoma City gave an address for the uplifting of the veterinary pro fession, which was beneficial to all who were present;

Dr. Fred Eagle in an interesting talk discussed the betterment of the profession;

Doctors F. F. Meades, A. O. Hughes, J. M. Vrba, E. M. Prather, J. E. May, W. F. Hall, J. A. Lowell, F. M. Starr took part in the various discussions.

R. C. SMITH, Secretary.

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CONNECTICUT VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Connecticut Veterinary Medical Association was held at the Hotel Garde, in Hartford, on Tuesday, February the first.

Eighteen members were present and the following officers were elected: President, Dr. G. E. Corwin, of Canaan; First Vice-President, Dr. G. L. Cheney, of New Haven; Second Vice-President, Dr. F. D. Monell, of Derby; Secretary, Dr. A. T. Gilyard, of Waterbury; Treasurer, Dr. Thos. Bland, of Waterbury.

Doctors J. S. and E. F. Schofield of Greenwich invited the association to their town for its next summer meeting.

This invitation was accepted with much enthusiasm and several papers were promised. The secretary was instructed to confer with the Schofields regarding the date of the meeting as well as the program. The members present entered into a very interesting and lively discussion of cases, and everybody seemed to be willing to talk, and the afternoon slipped away very quickly.

Dr. Bland passed around copies of a booklet containing a copy of the Veterinary Practice Laws of Connecticut and a list of the veterinarians licensed to practice in the state. This pamphlet has been compiled for the association by Dr. Bland and copies of it may be had upon application to the secretary.

A. T. GILYARD, Secretary.

COMMUNICATIONS

A VETERINARY EMBLEM

Editor of the Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

DEAR SIR: Some two years ago the Rockland Co. N. Y. Veterinary Association suggested to the American Veterinary Medical Association the importance of adopting a distinctly veterinary emblem that might be used on vehicles or in miniature be worn as a pin. The blue cross was also suggested as the emblem.

The subject was carefully considered and much data regarding the cost as well as suggestions as to the form and colors to be used were taken to the Oakland meeting. At Oakland a communication was received from a prominent army veterinarian, stating that an international conference was to be held at Bern in the near future to adopt an international veterinary emblem for the protection of horses in war. The writer also stated that it was quite certain that the emblem adopted would not be a blue cross, as to most veterinarians the blue cross is the emblem of the British Society for the Prevention of Cruelty to Animals.

In view of this information, it was thought best to postpone the consideration of the subject until the international congress has adopted what may be called an universal emblem.

N. S. MAYO.

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ILLEGAL PRACTICE

Editor of the Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

DEAR SIR: Thinking that reports of prosecutions of illegal practitioners might be regarded as news items of interest, I send you the following which you may publish in the next *Journal* if you see fit:

H. M. Cleaves, who claims to be a veterinary surgeon, and who has been practicing in Norfolk, Va. and vicinity, was recently arrested and tried before a Justice of the Peace, who fined him fifty dollars and cost, in default of which he was sent to jail.

Respectfully yours, H. BANNISTER, Sec'y.

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Editor of the Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

DEAR SIR: In relation to the case report in the February number under the head of "What Was This Trouble?" by Dr. Walter M. Pendergast of Syracuse, N. Y. I would suggest that it reads very much like an outbreak of anthrax in cattle partially immune. Partial immunity might have been brought about by the cattle being native to anthrax soil or by vaccination.

The sypmtoms—excessive temperature, suppressed and bloody milk secretion, dark feces, and the history—inundated pasture and the fact that cattle kept in the stable escaped, to me points strongly to anthrax.

R. W. GANNETT,
74 Adams St., Brooklyn.

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Editor of the Journal of the American Veterinary Medical Association, Ithaca, N. Y.:

The December and January numbers of your Journal afford very interesting reading, to both the profession and stock owners; to all, in fact, who are interested in the detection and suppresion of contagious diseases in the animal kingdom.

The articles are particularly interesting to me, as one who acted as veterinary inspector under the British Government in the North of Scotland, for the County of Inverness, where, in the years 1872,-3, there was more than one outbreak of epizootic aptha, (commonly called foot-and-mouth disease,) in both the bovine and ovine tribe.

In the recent outbreak in the United States, referred to in said articles, it is beyond my ken how this disease, with its specific symptoms, could, for one week, baffle the profession in its diagnosis, especially since this was not the first outbreak in this country: the delay thus occasioned causing tremendous unnecessary expense to the federal government, in the final stamping out of the disease.

To me, this seems a remarkable lack of professional knowledge, allowing the plague to get sixteen days headway, without recognition.

The abnormal temperature and depressed condition in the latent period of foot-and-mouth disease, is always the forerunner, without visible lesions, and isolation for four days in the first cases suspected, if an error, would at least be an error on the safe side. In my opinion, the symptoms should have been recognized at once.

This being a specific disease, it has a latent period, in my experience, of only four days; an incubative period of less than twelve days, and a special appointing period, certainly within fourteen days. I need not go over the physical symptoms of these periods, but they are conclusive and of a specific character.

I certainly agree with the energetic measures taken by the federal government in the quarantine and general slaughter, in all affected areas, and the extreme care exercised in disinfecting every possible means of transmitting the contagion, and indeed the crow, black though he be, could be painted a little blacker because of the part he plays in carrying the germs of this scourge.

In my experience in handling this disease in Scotland, I never knew a case to end fatally, in either the bovine or the ovine tribe. Its lesions are limited to all mucous membranes, with a temperature

up to 106°; difficulty in mastication, deglutition and rumination; with a profuse dripping of saliva, resulting in a peculiar smacking of the lips. These are specific symptoms of the disease, and I have known animals to reduce in weight from 600 pounds to 400 pounds. But the convalescent period is short, within two months the animal will regain its normal weight, under favorable conditions, unless there are serious foot lesions, which may assume a chronic character. I mean in the bovine and ovine.

We did not, in the North of Scotland, resort to the slaughtering process, or even the strict quarantine, as at that time, the movement of animals in that district was very limited, and as a rule, within six weeks the epizootic ceased to exist. I am recording this from personal observation while acting as government inspector in that country.

I can understand the complications existing in this country between the federal and state veterinary departments, and can illustrate the indifference of the veterinary department of the State of New York, by the following condition: Why was bovine pleuro-pneumonia allowed to ravage the whole of Long Island for ten years, before it was detected and stamped out by a private practicioner? You will admit that this deserves an answer from the veterinary staff of the agricultural department of the State of New York.

It is bad surgery to try to heal up a wound while a foreign body remains in it. I am induced to offer the above remarks in the belief that I am the only veterinary surgeon, at least in the United States, who had full government supervision and handling of this malady before the stamping out process was ever thought of, some fifty years ago.

L. McLEAN, M. R. C. V. S.

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REVIEWS

INFECTIOUS DISEASES OF ANIMALS AND THEIR CONTROL IN WAR

PROF. HERMANN MIESZNER, Hanover, Germany
162 pages and 37 illustrations. Published by M. H. Schapper, Hanover, 1915

The author, who is Professor and Director of the Department of Hygiene of the Royal Veterinary High School, in Hanover, Germany, endeavored to treat this subject in a most practical way, free from unnecessary theories, yet from a purely scientific point of view. He divided the subject into two part, general and special. The general part describes the field hospitals and depots for horses, the moving laboratories for serological examinations behind the

battle fronts, and finally a thorough chapter devoted to disinfection. The special part deals with the symptomatology, pathological anatomy, symptomatic therapy, serum, vaccine and chemotherapy of the different infectious diseases, such as glanders, anthrax, rabies, scabies, influenza, strangles, coryza, dourine, contagious pleuropneumonia of cattle, peripneumonia bovum, and rinderpest. The use of salvarsan and arsinosolvin is described in detail.

Special attention is given to the differential diagnosis of various diseases. The routine laboratory tests, and the various biological tests applied to animals for diagnostic purposes are well described and illustrated. The illustrations picturing the ophthalmic reaction are especially noteworthy.

This work now occupies a unique place in veterinary literature since it represents the first publication which describes the ways and means by which it is aimed to control animal plagues under such unfavorable conditions as exist during the present conflict.

The author has certainly treated this important subject very thoroughly, and the volume deserves careful attention, especially by the veterinary sanitarians.

EICHHORN.

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ESSENTIALS OF VETERINARY LAW

HENRY BIXBY HEMENWAY, A.M., M.D.

Fellow, American Academy of Medicine; Fellow American Medical Ass'n, etc. Published by the American Journal of Veterinary Medicine, Chicago, Ill., $3.00.

This volume of 340 pages is published as No. 10 in the Veterinary Medicine Series. The author states there has been a request for a handbook which could be used as a text in veterinary schools and agricultural colleges. The perfunctory way in which veterinary jurisprudence has been taught in many of the veterinary schools and the absence of such instruction in many of the agricultural colleges, would indicate that such a book is of timely interest, not merely as a text book but as a book of reference for the many who have passed through college without adequate information on this subject.

The book has been divided in four parts including ten chapters. Part I deals with fundamental and general legal principles as a

basis for the more specific principles applicable to veterinarians and agriculturalists.

Part II appertains more particularly to veterinary practice. Information is given relative to the authority of the state; license to practise; revocation of license; what constitutes veterinary practice; veterinary contracts; errors of judgment; liabilities for the acts of others; cases of malpractice, liability for accidents; liability for operation; right to sue for fees; amount of compensation; liens; expert testimony, etc.

Part III deals more particularly with veterinarians, in the government service. Their jurisdiction and authority as officers are discussed especially with reference to quarantine, destruction of property, appraisement and liability for infectious diseases, etc. Another chapter deals with dairy inspection, dairy products; the meat industry, including transportation of live stock, quarantine regulations, supervision of slaughter houses, ante and postmortem examinations, meat inspection, etc. A few pages are also devoted to biologic products.

Part IV pertains to animals generally. A chapter is devoted to the ownership of animals and another to bailment. This section has much legal information, especially for the agriculturalist but also of use to the veterinarian. A number of pages is devoted to the citation of cases. Following a complete index is a short chapter on Collecting by Mail, by W. B. Parker.

Although the summary given above is incomplete, it is sufficient to indicate the general scope of the work. Veterinarians should have a more extended knowledge of their rights, liabilities and responsibilities; they should know enough of the legal aspects of the live stock industry to be of service to advise and co-operate with their agricultural clients. Heretofore this knowledge has not been easily obtainable in concise form. The present book meets this need.

P. A. F.

NECROLOGY

JAMES H. FERSTER

Dr. James H. Ferster was born in the State of New York sixty-three years ago, March 2, 1853. As a young man he located at Rochester, N. Y., where he was engaged in the advertising business, later going to New York City, where for a number of years he was on the staff of the New York Sun.

Following his newspaper experience, Dr. Ferster practised as a veterinary physician and surgeon in Plainfield, N. J., and then moved to New York City, where he has since engaged in veterinary practice. He was graduated in this state March 4, 1890, and for a number of years lectured in the New York College of Veterinary Surgeons on canine pathology.

He was a member of the New York Driving Club, the R. D. A. N. Y., and the Nassau Driving Club, serving as president of the two former clubs in 1914, and he also was a prominent factor in the recently organized New York State Association of Horsemen.

Dr. Ferster was taken with pneumonia, but within a few days was reported to be on the road to recovery. He suffered a relapse, however, and all efforts to check his decline were unavailing. He leaves one son, Charles Ferster. Dr. Ferster was a great friend to little children. A few weeks before his death, Dr. Ferster published, in the Trotter and Pacer, the following lines:

I place one hand in God's and then I know
I cannot fall; and then as far below
As I can reach, I stretch my other hand
And in the slum and depth of wickedness I find
A fallen fellow man. I shout "Hello!
'Tis Christmas morn—look not below
But up." I grasp his hand and hold it tight
As mine is held by Thee, and pray for might
To help me put his trembling hand in Thine.
Then Thou wilt draw him by Thy power divine
Unto Thyself. Then he, like me, will stand
One hand in thine; the other stretched toward man.
For he can reach some man that I cannot.
He knows some tender chord I have forgot.
And as I see him lift, and place some other's hand
In Thine, I quietly give thanks that Thy great plan
For saving man is through his fellow man.
Give thanks for more: Give thanks that God saw fit
In saving men to let me help a bit!

D. ARTHUR HUGHES

David Arthur Hughes died at Chicago, February 14, from an attack of grippe, followed by pneumonia, with heart complications, at the age of forty-six. Dr. Hughes was born in Liverpool, England and came to America at the age of fourteen. He graduated at Cornell University, specializing in literature and later returned to specialize still further and to obtain an advanced degree. He was a winner of a Shakespearean prize. He graduated from the New York State Veterinary College at Ithaca, N. Y., with the class of 1903, and was married in 1907.

For a number of years Dr. Hughes has been Inspector of Food Supplies for the Quartermaster's Corps, United States Army at Chicago. He was also Professor of Dairy Inspection, Milk Hygiene and Medical Botany, at the Chicago Veterinary College and editor of the *Quarterly Bulletin*.

Dr. Hughes was a voluminous writer. His signed articles were frequently seen in English and American veterinary, agricultural, medical and secular magazines. His interest in literature and veterinary affairs was profound and the profession suffers a decided loss in his untimely end.

DANIEL B. ERB

Dr. Erb died of heart failure last January at the age of 86 years. He was a resident of East Petersburg, Pa., and had practised farming and veterinary medicine for many years, although of late he had retired from active work. He is survived by five children, twenty-two grandchildren and ten great-grandchildren.

MISCELLANEOUS

CHRISTIAN CO-OPERATION IN FOOT-AND-MOUTH DISEASE: According to Wallace's Farmer, a case of foot-and-mouth disease broke out again on January 17, in Christian County, Ill., and another case was discovered January 28. The farmers took prompt action. A mass meeting was held at the county seat. Representatives were present from every township in the county. A county live stock organization was effected and a circular letter wes sent to more than two thousand farmers in the county, telling them of the danger, and of the part it would be necessary for them to play to stamp out the disease. Visiting back and forth promptly went out of fashion, dogs were destroyed or confined at home. Peddlers and subscription solicitors were put out of business at once. On a large number of farms, cans containing disinfectants were installed near the gates, and farmers and their families disinfected their shoes when leaving home and again when returning. There were no appeals to the court, no political oratory, no foolishness of any kind. Everybody joined in doing what experience has shown to be necessary to stamp out the disease. [We trust there are other Christian Counties where this spirit of co-operation will prevail in time of need.]

The Utah Agricultural College at Logan has included in its short extension courses, one for veterinarians which has proved of much interest.

At the meeting of the Michigan State Veterinary Medical Association held at Lansing, Mich., Dr. George W. Dunphy was elect ed president.

The eleventh annual meeting of the Ohio Valley Veterinary Medical Association was held at Terre Haute, Ind., February 9. About 150 members were in attendance from Indiana, Illinois, Ohio and Kentucky. A very successful meeting was reported. At the banquet, Dr. D. M. Campbell of Evanston, Ill., officiated as toastmaster.

The State Board of Agriculture of Rhode Island has issued regulations that any person or firm bringing into the state for selling or using anti-hog cholera serum, virus of hog cholera, tuberculin, mallein or other biological products used for testing or